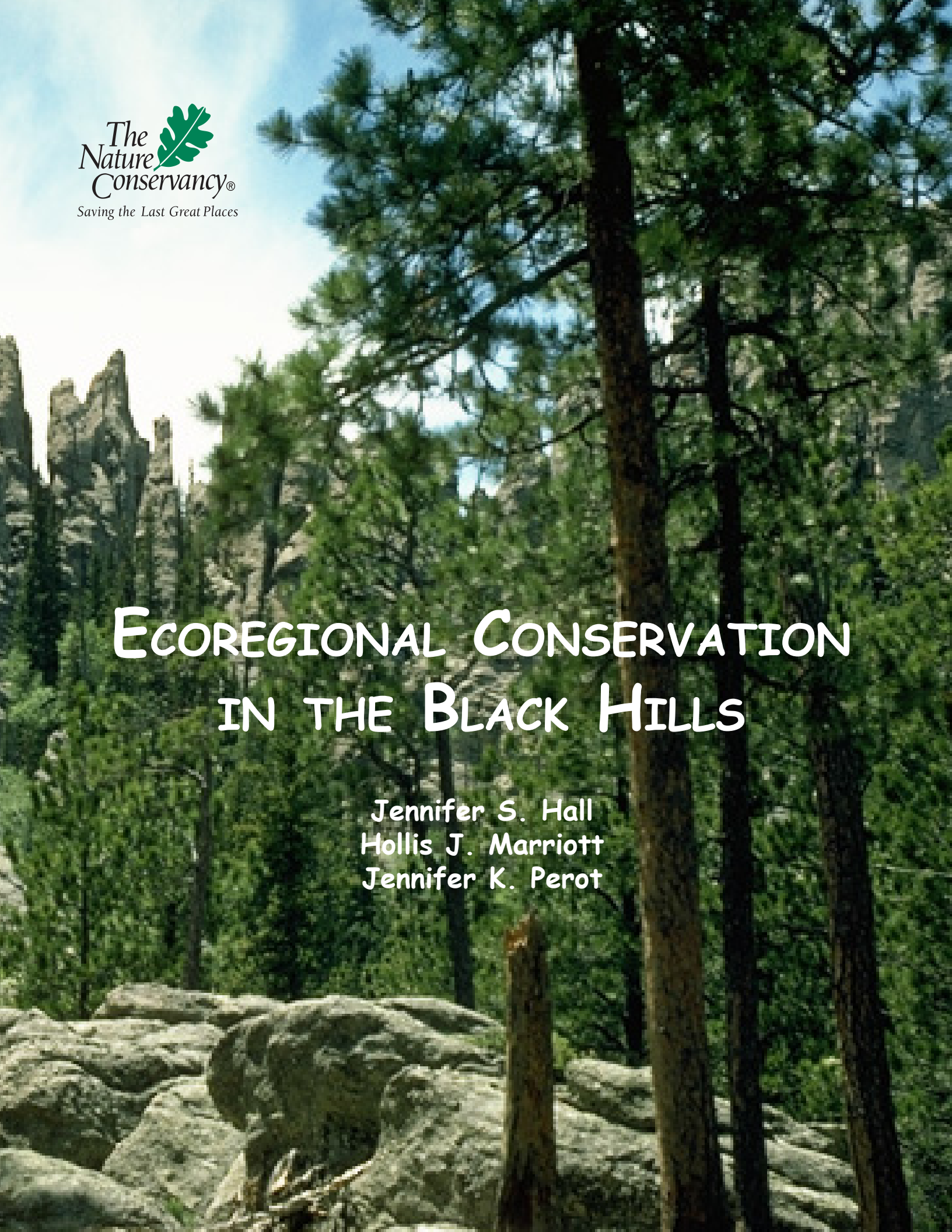

Ecoregional Conservation in the Black Hills

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ACKNOWLEDGEMENTS

The Black Hills Ecoregional Planning Team consisted of (in alphabetical order): Gary Beauvais (Wyoming Natural Diversity Database), Doug Backlund (South Dakota Natural Heritage Data Base), Steve Chaplin (TNC Midwest Conservation Science), Walt Fertig (Wyoming Natural Diversity Database), Jennifer Hall (TNC Midwest Conservation Science), Hollis Marriott (formerly TNC), Dave Ode (South Dakota Natural Heritage Data Base), Bob Paulson (TNC Black Hills Program Office), Jen Perot (TNC Freshwater Initiative), and Brian Schreurs (TNC Midwest Conservation Science). Over the coarse of the planning process, members of the planning team either contributed to the methods of the planning process, as scientific contributors, or both.

Beyond the team, many individuals and organizations/agencies offered critical expertise to this effort. Special thanks are given to various staff at The Nature Conservancy for their assistance to the planning team during the planning process. Wayne Ostlie facilitated the organizational meeting that started the planning effort. Pat Comer provided critical guidance and discussions on developing the ecological systems classification. Mary Lammert led the aquatic experts workshop. Tom Fitzhugh provided GIS support for the aquatic classification. Holly Copeland provided GIS data from the Wyoming Field Office.

The authors are especially thankful for the editorial comments provided by Beth Burkhart and Elaine Ebbert.

The authors would like to thank the following individuals for donating their time and expertise at a terrestrial site selection workshop: Gary Brundige (Custer State Park), Marie Curtin (Wind Cave National Park), Dave Pieper (Black Hills National Forest), Mike Wiles (Jewel Cave National Park), Steve Ogle (WYNDD). Special thanks to those individuals who gave their time and expertise at an aquatic expert workshop: Jack Ericson (SD Game, Fish and Parks), John Rupe (Black Hills National Forest) and Alan Witmuss (SD Department of Environment and Natural Resources).

For their phone or email consultation on various components of the terrestrial ecoregional assessment, the authors would like to thank Deanna Reyher (Black Hills National Forest), Carolyn Sieg (USDA Forest Service), George Jones (WYNDD), Gary Larson (SD State University), Barry Parrish (USDA Forest Service), Mike Pfaum (Mt. Rushmore National Memorial), Dan Roddy (Wind Cave National Park), Todd Suess (Devils Tower National Monument), Kerry Burns (Black Hills National Forest), Maggie Engler (Rocky Mountain Elk Foundation).

For their phone or email consultation on various components of the aquatic ecoregional assessment, the authors would like to thank Richard Baumann (Brigham Young University), Travis Cundy (Wyoming Game and Fish), Arden Davis (South Dakota School of Mines), Ron Glover (Black Hills National Forest), Jon Hortness (USGS), Brian Kondratieff (Colorado State University), Ron Koth (SD Game, Fish and Parks), Bob McDowell (Wyoming Game and Fish), Ron Remmick (Wyoming Game & Fish), Joe Sandrini (trib.com), Jack Smith (Wyoming DEQ), Bill Stewart (SD – DENR), Bud Stewart (Wyoming Game and Fish), Mike Strobel (USGS), Monte Williams (Black Hills National Forest), Joyce Williamson (USGS).

EXECUTIVE SUMMARY

The Black Hills ecoregion is one of 64 terrestrial ecoregions in the continental United States, and encompasses an area of 5121 square miles (roughly 3 million acres). The varied topography, geology and climate result in a corresponding variety in plant communities, including such diverse elements as western ponderosa pine forests, grasslands of the Great Plains, and northern white spruce forests. Midwest hardwood types are well-represented by stands dominated by oak, ash and elm. Euro-American settlement and activity in the Black Hills have been widespread since the 1880s, and have greatly impacted the Black Hills at a landscape scale. Interaction between natural landscape-scale ecological processes and human-caused processes have altered the fire regime, hydrology, grazing patterns, insect epidemics, wildlife and flooding in the Black Hills landscape in many ways.

Until recently, there has not been a comprehensive look at the biodiversity and conservation needs in the Black Hills. By applying The Nature Conservancy's ecoregional-based conservation approach in the Black Hills, a comprehensive list of areas of biodiversity significance in the Black Hills can be identified. Ecoregional conservation is inherent in The Nature Conservancy's goal to ensure "the long-term survival of all viable native species and community types through the design and conservation of portfolios of sites within ecoregions" (The Nature Conservancy 1996). Ecoregional conservation in the Black Hills is based on two independent, but interrelated assessments – a terrestrial ecoregional assessment and an aquatic ecoregional assessment.

The results of this planning effort represent a first iteration of ecoregional planning in the Black Hills based on the knowledge currently available regarding biodiversity in the Black Hills. Conservation targets (those ecological systems, communities and species around which the ecoregional conservation plan was assembled) include 7 terrestrial ecological systems, 12 aquatic ecological systems, 63 terrestrial community associations, 39 plant species and 34 animal species. Conservation goals (the number and distribution of populations/occurrences required to sustain the targets over time within the ecoregion) were set for each of the conservation targets. Viability, the ability of a population, species or community type to persist over time, was assessed when possible for all target occurrences. Where possible, only examples of targets thought to be viable were included in the analysis.

Areas of biodiversity significance were identified which encompass conservation targets and provide a starting point for further work in site-based conservation planning. The resulting ecoregional conservation portfolio consists of 40 sites. Together, these areas account for nearly 821,390 acres, or 25% of the ecoregion's total area. In this report, no strategies are suggested for carrying out comprehensive conservation action in the ecoregion. In addition, this report provides a list of research needs in the ecoregion.

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I. Introduction to Ecoregional Conservation

Several years ago, The Nature Conservancy translated its broad mission of biodiversity conservation into a clear goal that would promote a unified method of taking effective conservation action. That goal, as stated in *Conservation by Design: A Framework for Mission Success*, is "the long-term survival of all viable native species and community types through the design and conservation of portfolios of sites within ecoregions (The Nature Conservancy 1996)." Inherent in this goal is the Conservancy's commitment the four-part **conservation approach**: setting priorities, developing strategies, taking action, and measuring success (Figure 1).

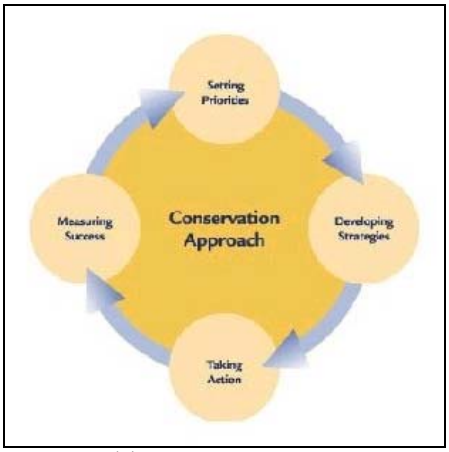

Figure 1. The Nature Conservancy's Conservation Approach.

Setting Priorities

Conservation planners at The Nature Conservancy set priorities through the selection and design of "portfolios of conservation areas within and across ecologically similar regions" (The Nature Conservancy 2000a). This process called **ecoregional planning** is both complex and iterative. The end result is the identification of areas that comprehensively conserve the biological diversity of the region. The areas make up a "portfolio" of conservation areas for the ecoregion, integrating the actions of the Conservancy with those of our partners.

The process starts with the identification of the important elements of biological diversity that will be used to select the final portfolio of conservation areas. These important elements, or **conservation targets**, represent critical biological resources at many scales. They include:

- terrestrial ecological systems;
- aquatic ecological systems;
- plant community associations; and
- plant and animal species.

After the conservation targets are selected, numeric **conservation goals** are established for each target. The goal represents the number of viable occurrences, *and* the spatial distribution of a target across the region thought to be needed to maintain a population over the next 100 years.

The **portfolio of conservation areas** is drawn from the most viable examples of the conservation targets. Selection of conservation areas starts with the largest scale targets (ecological systems) for efficiency of target capture. The final portfolio includes all areas that most effectively meet the conservation goals. The highest priority areas in the portfolio are selected as the most important places for the Conservancy to work in the near-term.

After the Conservancy sets ecoregional conservation priorities, the next phase of our conservation approach begins – developing strategies through conservation area plans, taking conservation action and measuring success of those actions. Conservation targets and ecosystem threats can be addressed in a more comprehensive and detailed manner at individual conservation areas. Additionally, it is through this finer-scale, more detailed conservation area planning that the data

gaps and impurities in the first iteration of this ecoregional plan can be resolved. Conservation planners then use the new information to review and revise the conservation priorities and process.

BLACK HILLS ECOREGIONAL PLANNING

Prior to this study, there had not been a comprehensive look at the biodiversity and conservation needs in the Black Hills. Areas within the Black Hills currently being managed for conservation were chosen for a variety of reasons – scenic, historic, and biological value, to name a few. This current system of protection is inadequate to protect the full range of biodiversity of the Black Hills (Fertig and Oblad 2000, Marriott *et. al.* 1999). By applying the Conservancy's ecoregional-based conservation approach in the Black Hills, a comprehensive list of areas of biodiversity significance in the Black Hills can be identified, hopefully filling in gaps in the current protection network. Areas are recommended for conservation that attempt to ensure the long-term survival of all native species, communities, and ecological systems in the Black Hills. The results of this planning effort represent a first iteration of ecoregional planning in the Black Hills based on the knowledge currently available regarding biodiversity. The conservation targets and conservation areas included here are well documented and clearly of conservation value and concern.

This ecoregional analysis will serve well as a basis for immediate conservation action by The Nature Conservancy and its partners in the Black Hills. In addition to a conservation action plan, this report serves as a list of research needs in the ecoregion. It is intended that this first iteration of the Black Hills ecoregional planning will guide The Nature Conservancy, and potentially State and Federal agencies, and other partners in taking effective on-the-ground conservation action over the next three-to-five years. By planning at the site level and measuring success, it will then be possible to reassess and improve the plan for conservation in the Black Hills.

This planning effort was benefited greatly by the expertise of the individuals involved. The planning effort started in March of 1999 with a meeting in Custer, SD. The following individuals contributed to the methods of the planning process and/or to the scientific information contained in this report:

- Gary Beauvais, Wyoming Natural Diversity Database
- Doug Backlund, South Dakota Natural Heritage Data Base
- Steve Chaplin, The Nature Conservancy, Midwest Conservation Science
- Walt Fertig, Wyoming Natural Diversity Database
- Jennifer Hall, The Nature Conservancy, Midwest Conservation Science
- Hollis Marriott, formerly with The Nature Conservancy
- Dave Ode, South Dakota Natural Heritage Data Base
- Bob Paulson, The Nature Conservancy, Black Hills Program Office
- Jen Perot, The Nature Conservancy, Freshwater Initiative
- Brian Schreurs, The Nature Conservancy, Midwest Conservation Science

Bob Paulson served as the Sponsor of the Black Hills ecoregional planning effort and was responsible for assembling the planning team, obtaining funding for the effort, serving as liason with the Conservancy's Wyoming Field Office and Great Plains Division Office, and will be responsible for the eventual implementation of the plan. Jennifer Hall was the Team Leader for this planning effort and was responsible for initiating each step in the planning process; working with members of the planning team to assemble the target list, set conservation goals and finalize the portfolio of conservation areas; organizing team and expert meetings; compiling the final results; and co-authoring this final report.

Hollis Marriott, co-author of this report, provided most of the community information (Marriott *et. al.* 1999), as well as developed the ecological system classification. Jen Perot, also a co-author, worked with experts in the Black Hills to develop the aquatic classification and portfolio sites. Steve Chaplin was a mentor for this planning effort, providing a wealth of information about the Conservancy's ecoregional planning process and the Black Hills. As GIS Manager for this planning effort, Brian Schreurs obtained GIS data sources, managed the GIS data, produced maps and data products, assisted in the site selection process by digitizing site boundaries, and helped perform many of the final analyses.

Both Heritage Programs were very generous with their time, data resources and knowledge of the Black Hills. Gary Beauvais and Doug Backlund drafted the animal target list and conservation goals. Walt Fertig and Dave Ode drafted the plant target list and conservation goals. Ode also assisted Hollis with goals for community targets. All of these individuals contributed greatly with information about the conservation areas. Both Heritage Programs also contributed their element occurrence databases to the planning effort.

II. An Island in the Plains - The Black Hills

The Black Hills are an isolated mountain range in the Great Plains of western South Dakota and northeastern Wyoming (Figure 2). Trending roughly northwest–southeast, the uplift is approximately 125 miles long and 60 miles wide, with an area of more than 3 million acres. The highest peak in the Black Hills is Harney Peak (elevation 7,242 feet above sea level) while the plains surrounding the range are about 3,000 feet in elevation. The name "Black Hills" comes from the dark covering of ponderosa pine that contrasts with the surrounding prairie. The map of the Black Hills in Figure 2 shows the counties, larger towns, roads, drainages and other important features that are frequently used as location references in this report.

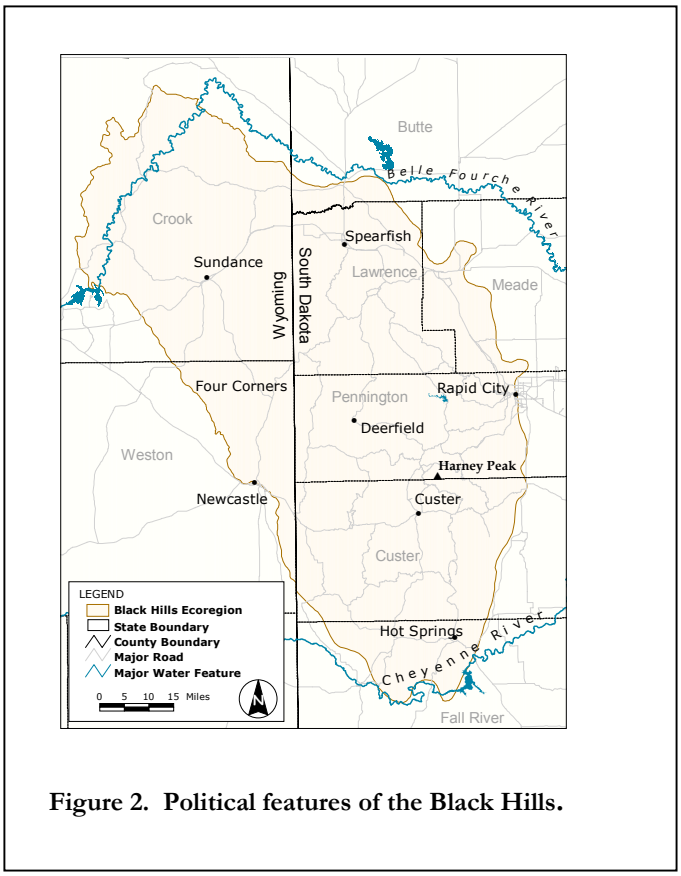

Figure 2. Political features of the Black Hills.

The Black Hills ecoregion is one of 64 terrestrial ecoregions in the continental United States. The vegetation, topography, and geology of the Black Hills are strikingly different from the surrounding Northern Great Plains Steppe Ecoregion. This is the only ecoregion completely contained within another ecoregion – an "island in the plains." The Black Hills ecoregion is the smallest of all U.S. ecoregions, with an area of 5,121 square miles (roughly 3 million acres).

Although the Black Hills ecoregion is as large as several of the largest sites within the Northern Great Plains Steppe ecoregion, its distinctive flora, fauna, landscape processes and ecosystem dynamics warrant treatment as a separate ecoregion. As is true in other planning efforts, the scale at which planning was conducted in the Black Hills ecoregion was reflective of the scale at which landscape-scale processes function. For many conservation targets, this scale is relatively small compared with those of other ecoregions. This situation needs to be taken into consideration in order to make planning and the resulting portfolio as consistent as possible with other ecoregions. For example, the resulting portfolio should not contain only a few extremely large sites, nor hundreds of smaller sites. In order to be successful, the end result of this planning process must identify the important areas of biodiversity in the ecoregion – those places that will ensure long-term viability of the conservation targets.

Geology and Geomorphology

The Black Hills uplift is the product of the Laramide mountain-building episodes that produced most of the ranges in the Rocky Mountains. Uplift began near the end of the Cretaceous period, 65 million years ago and ended by 35 million years ago (Froiland 1990). The result was a broad-backed anticline shaped by subsequent erosion into a rounded mountain range, with concentric exposures of progressively younger rocks moving from the center of the range outwards.

This report recognizes five geomorphic regions: Central Core, Limestone Plateau, Minnekahta Foothills and Plains, Red Valley, and Hogback Rim. Four are described by Darton and Paige (1925); Froiland (1990) recognized the fifth geomorphic subdivision (Minnekahta Foothills and Plains). The Central Core consists of the oldest exposed rock – ancient Precambrian granitic and metamorphic rocks more than 1.6 billion years in age. Elevations are relatively high, and this region includes Harney Peak, the highest point of the Black Hills uplift (7,242 ft). Mt. Rushmore and the Black Hills Needles are other famous outcrops of the Central Core. The Limestone Plateau surrounds the Central Core. It is underlain by the Paleozoic Pahasapa Limestone, which has resisted erosion to produce a high broad surface west of the Central Core. The Minnekahta (also called Minnelusa) Foothills and Plains is a zone is made up of broad, rolling landscapes in the southern and western Black Hills, where the underlying strata are not steeply tilted. In the northern and eastern parts, the Minnekahta region is more foothills-like. Surrounding the higher elevations of the Central Core and Limestone Plateau is the Red Valley or Racetrack (derived from the Mesozoic Spearfish Formation), a collection of red sandstones and siltstones with occasional gypsum outcrops. The outermost geomorphic region of the Black Hills is the Hogback Rim, composed of sandstones, siltstones and shales of late Mesozoic age. On the southern and eastern flanks, these sandstones form prominent hogbacks–steeply tilted exposures. In the northwestern Black Hills, the strata dip much more gently, and underlie broad sandstone-capped ridges and divides, with sandstone-rimmed canyons. Elevations in the Hogback Rim vary from 3,100 ft. near Colony in northeast WY, to 4,900 ft. in the Elk Mountains south of Newcastle, WY.

Also of geomorphological significance is a zone of Tertiary igneous intrusive and volcanic features found in the northern part of the uplift. This was an area of igneous activity late in the episode of mountain-building that produced the Black Hills (Lisenbee *et. al.* 1981). The most famous of these features are Devils Tower (5,117 ft.) and Bear Butte (4,422 ft.), but there are many others, including Inyan Kara Mountain, Sundance Mountain and the Bear Lodge Mountains.

The Bear Lodge Mountains, or simply Bear Lodge, are a small uplift superimposed on the Black Hills uplift during the time of Tertiary igneous activity in the northern part. The highest elevations in the Bear Lodge are at Warren Peaks near the southern end (6,650 ft.). Technically a part of the Black Hills range, the Bear Lodge is sometimes considered distinct from the "Black Hills proper," the two being separated by the Red Valley in the vicinity of Sundance, WY.

ECOREGIONAL BOUNDARY

The Nature Conservancy's US ecoregions are based in part on the US Forest Service ecoregional provinces (Bailey 1995). The Black Hills ecoregion is defined in perimeter by the entirety of the Black Hills Coniferous Forest Province (M334). The Black Hills Section (M334A) is the only section within this Province. There are two ecoregional subsections: M334Aa (roughly equivalent to the Red Valley, Hogback Rim and Minnekahta Foothills) and M334Ab (roughly equivalent to the Central Core and Bear Lodge Mountains).

Both ecologists and geologists have considered the boundary of the Black Hills to extend farther north and northeast than that of Bailey's ecoregion, encompassing the pine and oak covered ridges along both sides of the Belle Fourche River in northeast Wyoming. This report is focused on the area within the officially recognized ecoregional boundary. There is concern that several key areas of biodiversity significance may have been overlooked during the Northern Great Plains Steppe ecoregional planning process (Northern Great Plains Steppe Ecoregional Conservation Team 1999). These areas are described in Section V of this report, but were not used in this ecoregional analysis.

CLIMATE

Within the Black Hills, precipitation is greater, variations in air temperature are more moderate, and wind velocities are lower than on the surrounding Great Plains (Froiland 1990). Mean annual precipitation ranges from 14 inches near the perimeter to 29 inches at stations in the north-central part (Martner 1986), and probably exceeds 30 inches at high elevations in the northwestern Limestone Plateau, the northern central area and at Warren Peaks in the Bear Lodge Mountains.

The northern Black Hills receive significantly more precipitation than the southern, the boundary between the two regions running roughly west from Rapid City through Deerfield. Throughout the Black Hills, 65 to 75 percent of the year's moisture falls as rain, or occasionally snow, from April through September (Froiland 1990). Storms are typically frontal prior to mid-June, and convective the remainder of the summer. Intense thundershowers are common. Monthly precipitation increases through mid-July, then drops off sharply, while mean daily air temperatures continue to rise into mid-August. Late July through early September is referred to as the dry season. Snow has been recorded in every month of the year, but commonly falls from October through April.

Average annual air temperature decreases with increased elevation, ranging from 47° F on the outer Hogback Rim to 36° F on the Limestone Plateau. As with precipitation, air temperature exhibits a north-south pattern (Froiland 1990); stations in the northern half of the Black Hills are cooler than those at similar elevations further south. Annual ranges in air temperature are fairly large, with highs above 100° F common at low elevations in July and August, and lows below -15° F occurring periodically throughout the area from December through February (Martner 1986).

Strong winds, including tornadoes, occasionally extend into the Black Hills from the Great Plains, but winds generally are moderated by the uplift. Velocities are greatest during spring and early fall (Froiland 1990).

Flora and Vegetation

The Black Hills have strong floristic ties to four of the North American biomes: Cordilleran (Rocky Mountain) Forest, Grassland, Eastern Deciduous Forest and Northern Coniferous Forest. The Cordilleran biome to the west is best represented; roughly 30% of the plant taxa of the Black Hills have their main ranges to the west. Midwestern, eastern and northern influences are also significant (McIntosh 1931, Fertig and Oblad 2000).

This botanical melting pot is reflected also in the mix of vegetation types found in the Black Hills. The varied topography, geology and climate result in a corresponding variety in plant communities, including such diverse elements as western ponderosa pine forests, grasslands of the Great Plains, and northern white spruce forests. Midwest hardwood types are well-represented by stands dominated by oak, ash and elm.

Much of the Black Hills are covered with ponderosa pine forest. It is the most extensive vegetation type over much of the higher elevation regions, in the Central Core, Limestone Plateau, higher Minnekahta Foothills and Bear Lodge Mountains. More mesic sites at higher elevations support stands of white spruce forest. Pine forest intergrades with ponderosa pine woodland, which is more common at lower elevations, in the lower Minnekahta Foothills, Red Valley, and Hogback Rim, and on warmer, drier sites at higher elevations. Pine woodland includes somewhat closed to open, savanna-like stands of ponderosa pine, often in association with graminoids.

Stands dominated by hardwoods occur in both upland and riparian sites. Upland types include aspen forest, which occurs extensively in the Central Core, Limestone Plateau, higher Minnekahta Foothills and Bear Lodge Mountains, and as occasional small stands at lower elevations. At lower elevations, bur oak, often mixed with ponderosa pine, can form large stands, especially in the northern and eastern parts of the Black Hills. On the northeastern perimeter, bur oak savanna with very little understory covers broad exposures of Mowry shale.

Riparian hardwood vegetation includes paper birch forest, which is common in both wet and dry drainages at higher elevations (Central Core, Limestone Plateau, higher Minnekahta Foothills and Bear Lodge Mountains). At lower elevations, this type gives way to stands of bur oak with ironwood. Other riparian woodland types include cottonwood stands on low elevation floodplains, and a mix of hardwoods species such as oak, ash, boxelder, elm and hawthorn in lower elevation draws and drainages.

Riparian shrublands at lower elevations are typically composed of a mix of shrubs such as western snowberry, gooseberry, currant and rose. Silver sagebrush occasionally forms large stands on floodplains. Thickets of western snowberry are common in draws and on floodplains. High-elevation streams support several shrub types, including willow and water birch.

Non-riparian shrubland types are best developed at lower elevations. Stands of big sagebrush are found in the outer part of the Hogback Rim. Mountain mahogany shrubland is represented by extensive stands on steeply-dipping outcrops of Minnekahta limestone east of Newcastle, WY.

Mixed-grass prairie grasslands are most extensive at lower elevations, in the Minnekahta Foothills, Red Valley and Hogback Rim. Dominant species include representatives of short, mixed and tallgrass prairies. High-elevation grasslands include the Black Hills montane grasslands, found in broad drainage bottoms on the Limestone Plateau and adjacent Central Core. The thin rocky soils on the summit of the Bear Lodge Mountains at Warren Peaks and on Cement Ridge south of Sundance, support a similar grassland type.

Graminoid-dominated wet meadows and streambanks are common throughout the Black Hills. Saline and alkaline wetlands are found in the Red Valley and some areas of the Hogback Rim.

Barren substrate communities are found on most of the rock types in the Black Hills. Extensive areas of igneous and metamorphic rocks occur in the Central Core, and in the zone of Tertiary igneous intrusions in the northern part of the range. Limestone outcrops are common on both the Limestone Plateau and in the Minnekahta Foothills, and sandstone is often exposed in the Minnekahta Foothills and Hogback Rim. Redbeds—badlands underlain by the red Spearfish Formation—occur in the Red Valley and along the Belle Fourche River in the northwest part of the uplift.

Landscape-scale Ecological Processes

Landscape-scale ecological processes are those processes that occur at the scales of hundreds to many thousands of acres, and cover not just a single community type, but mosaics of types across these scales. Fire, insect epidemics, wildlife activities, and flooding are examples of natural types of landscape processes. Euro-American settlement and activity in the Black Hills have been widespread since the 1880s, and are equally influential at the landscape scale. Interaction between natural landscape-scale ecological processes and human-caused processes have altered the Black Hills landscape in many ways. The roles of fire, insect epidemics, wildlife activities, and flooding, as well as related impacts from human settlement, are discussed below.

Fire

The role of fire in shaping Black Hills vegetation and landscapes has been the subject of much recent discussion (McAdams 1995, Brown and Sieg 1996, Parrish *et. al.* 1996, Shinneman and Baker 1997, Marriott *et. al.* 1999). At question is the role of ecological processes in shaping presettlement vegetation, for which only limited documentation is available. Deriving historical conditions from existing conditions is difficult due to the extensive impact of human settlement in the Black Hills. Models of vegetation structure, composition and distribution have had limited success because of the stochastic, unpredictable nature of vegetation establishment and succession. Finally, the time scale at which vegetation responds to natural large-scale disturbance is great enough to be influenced by long-term trends such as climatic change.

In spite of the controversy associated with Black Hills ponderosa pine ecology, there is general agreement that since the time of Euro-American settlement, human impact has occurred at landscape scales. Little, if any, of the pine vegetation has not been subjected to fire suppression and at least one episode of logging or timber harvest since the late 19th century. In some cases, fuel loads may have increased since settlement. Other activities such as road-building and grazing may have altered natural fire regimes by reducing fuel loads, as well as creating fire breaks (Shinneman and

Baker 1997). The widespread impact of human settlement in the Black Hills has produced a complex interaction of landscape-scale processes that is difficult to disentangle.

In the summer of 2000, wildfires burned all across the western US, including the Black Hills. Medium-sized fires burned near The Nature Conservancy's Whitney Preserve (Flagpole Mountain fire, 7,000 acres), Deadwood (Maitland fire) and Four Corners (Hagerman fire). In late August and early September, 2000, the Black Hills experienced its largest wildfire in recorded history. The Jasper Fire began on the southern Limestone Plateau, near Jewel Cave National Monument, burning generally northward for 15 days (USDA Forest Service 2000). Total area within the burn perimeter was 83,508 acres, although not all lands within were burned. Vegetation within the burn area includes several ponderosa pine forest types, stands of white spruce on northerly aspects, and very large meadows and montane grasslands. Tree mortality was variable, with some stands experiencing complete tree kill, others patchy, and still others unburned. Fire typically burns much cooler in grasslands and meadows, and it is expected that these vegetation types will return with normal or increased vigor.

Insect Epidemics

The mountain pine beetle (*Dendroctonus ponderosae*) also contributes to natural disturbances in Black Hills pine stands (Lessard 1986, Schmid *et. al.* 1994). Small infestations are common, but larger epidemics are restricted to areas of denser, relatively-young trees. Large areas of high tree mortality increase the likelihood of large intense burns, at least during the first few years while trees still have dead needles in place (Parrish *et. al.* 1996). Some authors have concluded that the influence of the mountain pine beetle has increased in the Black Hills, following fire exclusion and associated increase in tree density. However, the practice of thinning stands to reduce beetle impacts has likely compensated for any changes due to fire suppression. Parrish *et. al.* (1996) suggest that contemporary epidemics and ensuing fires may be less common because of widespread timber harvest. The USDA Forest Service (2000) commented that if mountain pine beetles occurred in the area before the Jasper Fire, they may attack fire damaged trees.

Wildlife

Reduction of wildlife populations in the Black Hills has had major impacts on vegetation in some cases. Parrish *et. al.* (1996, 2000 pers comm. to J. Hall) describe the loss of riparian and wetland habitat related to shrinking beaver populations. Through dam construction and impoundment, beaver expand the width of riparian zones and capture sediments, increasing valley bottom alluvium. Historical trapping and destruction of riparian vegetation (sources of food and building material) are the two major factors behind beaver decline.

At lower elevations in the Black Hills, bison and prairie dogs once played important roles in grassland ecology. Small bison herds currently are managed at Custer State Park and Wind Cave National Park. Both parks also contain prairie dog towns, as does Devils Tower National Monument. Prairie dogs are found elsewhere at lower elevations in the Black Hills, but are often subjected to eradication efforts outside of protected areas.

Hydrological Processes

The natural unpredictable variation in annual precipitation since the time of human settlement in the Black Hills makes assessment of human impact on ground and surface water difficult. Loss of surface water and lowering of water tables was observed in the 1980s, a decade which was relatively dry. However, with several wet years in the 1990s, water levels have increased. Given the natural

variation in annual precipitation, and the expected continued population growth, water shortages will continue to be a periodic concern in parts of the Black Hills, especially at lower elevations.

Water diversion for mining and hydroelectric power has had major impacts on streams in some parts of the Black Hills. Other modifications of stream dynamics have significantly altered riparian vegetation. Two rivers cross the uplift at lower elevations: the Belle Fourche River in the northwest, and the Cheyenne River at the southern end (Figure 2). The Belle Fourche is dammed where it enters the Black Hills at Keyhole Reservoir. As a result, the river downstream is now in an entrenched channel, and floodplain vegetation is not being maintained (H. Marriott, pers. observations compared with old photographs, and conversations with long-time residents). In contrast, the Cheyenne River flows unaltered until it reaches Angostura Reservoir. Floodplain vegetation is well-developed along some stretches of the Cheyenne.

Land Ownership and Management

Most of the public land within the Black Hills is managed by Black Hills National Forest (BHNF), with state, National Park Service (NPS) and Bureau of Land Management (BLM) lands scattered throughout. Custer State Park and Wind Cave National Park occupy large areas in the southeastern Black Hills. Both parks have bison herds that graze the prairies. The NPS manages three other small parks within the Black Hills: Mount Rushmore National Monument, Jewel Cave National Monument and Devils Tower National Monument.

Private land occurs throughout the Black Hills. The largest blocks in private ownership are at lower elevations in the Red Valley and Hogback Rim regions. Ranches are common here. There are also concentrations of private land in areas of historical and present-day mining, such as the Lead–Deadwood area. Many of the high elevation meadows of the Central Core and Limestone Plateau are privately-owned, as they were logical homestead sites with more potential for grazing, cultivation and mineral claims.

The Nature Conservancy owns 4,601 acres of land in the southern Hills – the Whitney Preserve at Cheyenne River Canyons. The Conservancy has also negotiated 13,623 acres of easements scattered throughout the Hills. The Conservancy realized the uniqueness and ecological value of the Black Hills long before ecoregional planning started. The Black Hills Program office was opened in 1996 and will continue conservation actions, using the completed ecoregional plan to guide acquisition, easement and partnership priorities.

Land Uses

The Black Hills are dotted with towns and criss-crossed with roads, and there are few large blocks of little-used land (GIS analysis by B. Schreurs 2000). Nine towns with populations of one thousand or greater are located within the uplift, and Rapid City (pop 55,000) is situated on the eastern flank.

Timber, mining, agriculture, recreation and tourism are the most important land uses. The Black Hills are considered the most productive timber source in the region because of the longer, warmer growing season and comparatively high annual precipitation (Knight 1994). Timber harvest occurs throughout the area, on both public and private lands. Gold mining has been an important industry in the high northern Black Hills since the late 1800s, although it may be declining with the closure of several large mines. Agriculture, predominantly cattle ranching, is most extensive at lower

elevations, but grazing and cultivation occur throughout the Black Hills on both public and private lands.

Recreational uses are many, including hunting, fishing, camping, sightseeing, hiking, rock-climbing, mountain biking, snowmobiling and skiing. Recreational use is heavy, by both the local population and the influx of tourism during the summer season.

III. Terrestrial Ecoregional Assessment

As discussed in the introduction, we begin with the selection of conservation targets. Conservation goals are set for each target and the viability of each target occurrence is assessed. All of this information is used to determine where the areas of biodiversity significance (portfolio of conservation areas) are in the region. Conservation in the Black Hills is based on two independent, but interrelated assessments – a terrestrial assessment and an aquatic assessment. This section discusses the terrestrial targets, our conservation goals for them, and their viability. Section IV has a similar assessment for aquatic targets, and Section V describes the areas which are proposed to conserve these targeted elements of biological diversity.

Ecological System Conservation Targets

There are two approaches that are commonly used for the conservation of biological diversity. The **coarse-filter approach** operates under the assumption that common species will likely be protected through conservation of ecological systems and natural plant communities. **Fine-filter** or species-specific conservation focuses mostly on rare species that won't be reliably protected by focusing on high quality examples of systems or communities. This two-tiered, combined approach was used for selecting terrestrial conservation targets and setting conservation goals for the Black Hills.

The coarse-filter approach to conservation has changed over the last several years. When The Nature Conservancy first began regional planning, it was assumed that site selection based on plant communities was an appropriate scale at which to work. The Conservancy has since realized that such an approach often fails to capture the large-scale ecological processes at work in a region. For long-term conservation of biological resources, the coarse-filter approach needs to target ecological systems in order to be comprehensive (Poiani and Richter 1999, Groves *et. al.* 2000). Ecological systems are defined as:

> dynamic spatial assemblages of ecological communities that: 1) occur together on the landscape; 2) are tied together by similar ecological process (e.g. fire, hydrology), underlying environmental features (e.g. soils, geology), or environmental gradients (e.g. elevation, hydrologic zone); and 3) form a robust, cohesive, and distinguishable unit on the ground (Groves *et. al.* 2000).

During this planning effort, ecologists at The Nature Conservancy and Association for Biodiversity Information began work on a national ecological system classification that would be consistent with the US National Vegetation Classification (Grossman *et. al.* 1998). The classification is not yet complete and therefore was not available to the planning team. Instead, ecologists on the planning

team drafted a classification of ecological systems for the ecoregion. In addition to the principles set forth by Groves *et al.* (2000), the planning team established one additional criteria to aid in the definition of Black Hills systems: there must be high confidence that patterns of co-occurrence consistently repeat themselves across the landscape.

There are seven multi-association ecological systems currently defined for the Black Hills:

- Ponderosa Pine Forest,
- Ponderosa Pine Woodland,
- Upland Aspen,
- High Elevation Riparian,
- High Elevation Wetland,
- Low Elevation Floodplain, and
- Prairie.

As more is known about the interactions of plant associations, more systems may be classified. Descriptions of each system type and a list of the plant associations found within each system are found in Appendix 1. It should be noted that some plant community associations occur in more than one system type. For example, Black Hills Streamside Vegetation occurs in both the High Elevation Riparian System and the High Elevation Wetland System.

Several proposed system types could not be defined with any consistency across the ecoregion, so were not included within this system classification. For example, a White Spruce High Elevation System could be defined to include several different spruce association types. However, these spruce types are not found consistently across the Black Hills – in some places they are found to occur in large stands on the limestone plateau where there is no granite and in other places it is found to occur in the high granite regions. In addition, some plant communities occur only linearly, or in small or larger patch areas, and are only appropriately addressed at the scale of the community occurrence.

Occurrences of each ecological system target were identified by the planning team. When GAP land cover maps become available for the entire planning unit, it may be useful to match the GAP land cover types to the system classification to more systematically map occurrences across the ecoregion.

It should be noted that the vegetation classification produced during the Black Hills Community Inventory (BHCI; more information on the BHCI below) organized plant associations into broader categories called Ecological Groups (Marriott *et. al.* 1999). These groups do not function well as larger scale conservation targets, as they are only organizational classes for plant associations with similar habitat characteristics and do not necessarily include plant associations occurring together on the landscape.

Conservation Goals

In ecoregional planning, **conservation goals** for targets are set with the hope of ensuring long-term viability, and maintaining genetic and ecological variation. The numeric goal for each target should consider the number and distribution of occurrences needed to conserve the element within the Black Hills. Goals reflect an understanding of a host of ecological variables, including: life history characteristics, threats to occurrences, key ecological processes and disturbance regimes (The Nature Conservancy 1997, Groves *et. al.* 2000a). Regional and range-wide conservation is a concern. Goals and sites are chosen to protect the full range of biodiversity across the ecoregion. Targets endemic to the ecoregion receive greater emphasis than those that occur in many regions. Thus, the goals for

the Black Hills are informed by the conservation work in other ecoregions within the range of each target.

There is very little information about the composition and functionality of ecological systems in the Black Hills to confidently assign numeric conservation goals. Until more information is gathered about the targets, the conservation goal for each system type will be to identify the highest quality occurrences of each system target.

Viability Assessment

Viability refers to the ability of a population, species or plant community type to persist over time (The Nature Conservancy 1996, The Nature Conservancy 1997, Groves *et. al.* 2000a). In ecoregional planning, assessment of viability is a necessary step to identify under what conditions the target occurrence will persist over time and ultimately in the identification of areas of biodiversity significance. The standards set forth by Groves *et. al.* (2000a) include:

> [t]o the extent practical, the long-term viability (100 years) of populations and occurrences of conservation targets is assessed with the three criteria of size, condition, and landscape context. No site should be included in the portfolio of sites unless the coarsest-scale target at that site has been assessed as viable with these three criteria or can be feasibly restored to a viable status.

The planning team developed draft guidelines for evaluating the viability each system occurrence (Appendix 1). Size and condition were the major factors used in identifying viable occurrences. Specific ranks (A-D) were not assigned to system occurrences, but all occurrences included met the general guidelines and were considered to be viable. Occurrences with low viability were not included in the planning effort. Plant community association occurrences within each system occurrence have been assigned specific ranks for size, condition and landscape context (see below).

PLANT COMMUNITY ASSOCIATION CONSERVATION TARGETS

The **Black Hills Community Inventory** (BHCI) was launched in 1995 to systematically classify and describe the vegetation of the Black Hills, and to identify high-quality examples of vegetation (plant community association) types (Marriott *et. al.* 1999). The goals of the project were to compile a comprehensive description of the vegetation of the Black Hills; to identify high quality occurrences of each community type throughout the study area; and to identify biologically significant sites where these types occur. The BHCI produced a comprehensive vegetation classification containing 68 plant associations, with detailed descriptions for each (Marriott and Faber-Langendoen 2000).

A list of 66 **plant community associations** conservation targets for the Black Hills ecoregional planning effort was derived from this vegetation classification (Appendix 1). Several plant associations identified during the BHCI are still questionable types in the classification. It has not yet been determined if these types are valid for the Black Hills - either because they are poorly defined or because only marginal examples have been found. These types are included on the ecoregional planning target list provisionally (noted with an "?" next to the common name in Appendix 1). Conservation goals have not been set for these types and they were not included in the ecoregional analyses.

The BHCI also provided the ecoregional planning team with a database of about 200 community element occurrences, based on 298 survey sites. Field survey during the BHCI took place primarily

on public land, so significant data gaps exist for community types occurring at lower elevations, where ownership is largely private. Even with a fairly comprehensive vegetation classification and numerous element occurrences, there remains a significant amount of work to be done in the Black Hills to build an information base adequate for the conservation of community diversity.

Conservation Goals

The previous section on ecological systems explained that conservation goals are set with the hope of ensuring long-term viability, and maintaining genetic and ecological variation. For community targets, it is necessary to understand the **distribution** and **spatial pattern** of each community type in order to understand how many examples of each type will ensure conservation. These ecological and geographical characteristics describe the relative geographic distribution of the community to the ecoregion (rangewide distribution) and how a community is distributed across the landscape (spatial pattern). Appendix 1 contains information on the distribution and spatial pattern of each community type.

There are four categories that describe the relative geographic distribution of the community to the ecoregion: endemic, limited, widespread and peripheral. **Endemic** communities are those types that occur in only the Black Hills and no other ecoregions. Eleven (16%) of the types described by the BHCI are endemic to the Black Hills. Nineteen (28%) are classified as **limited**, occurring mainly within the ecoregion, but also in several adjacent ecoregions. Twenty-five (37%) are **widespread** communities, common in many other ecoregions and widespread in the Black Hills. Thirteen (19%) are classified as **peripheral**; these are found mainly in other ecoregions, and are uncommon in the Black Hills.

There are four categories of spatial pattern commonly used to describes how a community is distributed across the landscape: matrix, large patch, small patch and linear. **Matrix** communities generally are widespread, have broader ecological amplitude, and are driven by regional-scale processes. **Large patch** communities may form extensive cover, but community boundaries correlate with a single dominant process or habitat characteristic. **Small patch** communities rarely form extensive cover, and usually have quite narrow ecological requirements. **Linear** communities are those that types that occur as long narrow stands (usually riparian communities along streams). Of the 68 plant communities currently identified for the Black Hills, 12 (18%) have been classified as matrix types, 20 (29%) as large patch types, 19 (28%) as small patch types and 17 (25%) as linear patch types.

Using general guidelines set by other ecoregional planning teams, conservation goals were established for each combination of distribution and spatial pattern (Table 1). These guidelines were then modified to better reflect distribution and abundance in the ecosystem, ecological importance, habitat vulnerability, current and future threats in the ecoregion, and the size of the ecoregion. It was often difficult to choose between the matrix and large patch categories in assigning patch type for Black Hills community types. For this reason, matrix and large patch communities were treated similarly in setting conservation goals. Conservation goals were increased for some riparian and wetland types. In western ecosystems, the value of riparian and wetland communities is disproportionate to their limited extent. In addition, riparian and wetland areas are threatened by mining, farming, a decrease in beaver populations, channelization and (more recently) housing development (Parrish 2000, pers. comm. with J. Hall). For these reasons, the goals for widespread and peripheral riparian and wetland communities, which had received relatively low preliminary values, were increased. Conservation goals were lowered for some sparse vegetation types. These

communities are of less concern due to lack of vegetation and lack of threats. Finally, a range of values was used in setting conservation goals for widespread communities to better reflect variability of types within the ecoregion.

Table 1. General guidelines used in setting conservation goals for plant communities in the Black Hills. Numbers represent number of viable occurrences desired in the ecoregional portfolio. Goals are based on historical patch size and rangewide distribution, but may vary for individual types based on habitat vulnerability, threat and expert knowledge of the community type.

	Matrix	Large Patch [sparse vegetation]	Small Patch, Linear [sparse vegetation] (riparian, wetland)
Endemic	9	9 [5]	6-9 [3]
Limited	3	5-9 [2-3]	3 [3]
Widespread	2-4	2-4	3 (6)
Peripheral	1-2	2-3	2 (6)

Conservation goals for each specific plant community type can be found in Appendix 1. Because general guidelines were used, conservation goals for most communities represent educated guesses by knowledgeable experts. In the absence of community-specific information, these guidelines provide consistency across vegetation types, and incorporate known community characteristics. In addition, goals were generously set, hopefully erring on the side of over-protection.

Viability Assessment

As discussed above, viability is typically measured in ecoregional planning by assessing the size, condition, and landscape context of each target occurrence. **Size** is a quantitative measure of the area and/or abundance of the occurrence. **Condition** is a measure of the quality of biotic and abiotic factors, structures, and processes *within* the occurrence, as well as the degree to which they affect the continued existence of the element occurrence. **Landscape context** is a measure of the quality of the biotic and abiotic factors, structures and processes *surrounding* the occurrence, and degree to which they affect the continued existence of the element occurrence. The Association for Biodiversity Information (ABI) and the network of Natural Heritage Programs are responsible for establishing criteria for the assessment (ranking) of these viability factors and for maintaining the ranks for each occurrence. The three factors are also combined into an overall element occurrence rank (eorank). These ranks range from A (high) to D (low).

Size, condition, landscape context, and overall eoranks were assigned during the BHCI to each element occurrence. Specifications used in element occurrence ranking for plant community types are found in Marriott *et. al.* 1999. In most cases poor quality occurrences (overall ranking less than B) were not documented during the BHCI. Large stands with appropriate species composition and lack of unnatural disturbance generally were ranked higher.

Occurrences with overall eoranks of B or higher were considered to be sufficiently viable to meet ecoregional conservation goals. However, several community types, mainly endemic and limited-range communities that were found to be in poor condition throughout much of their range, were treated on a case-by-case basis. Several BC- and C-ranked occurrences of these types were allowed to meet conservation goals, as these examples were the *best* examples of the community type found in the Black Hills.

Although all community occurrences were ranked as to overall quality, there is general agreement that community type viability could be revisited in future iterations of Black Hills ecoregional

planning. Marriott *et. al.* (1999) note that it was difficult to develop ranking specifications in the Black Hills, an area where "human activity has interacted extensively with natural processes."

Plant and Animal Conservation Targets

In order to ensure that all types of biodiversity are conserved and that species already in trouble in an ecoregion do not go extinct, ecoregional planning also includes species-specific targets for conservation. For species, conservation targets were chosen based on regional rarity, vulnerability, and existing and potential threats. Groves *et. al.* (2000a) set forth general guidelines for the selection of species conservation targets. They suggest including **imperiled species** (ranked G1-G2 by ABI) and **federally endangered and threatened** species. These guidelines proved to be an inadequate filter for many of the species in the Black Hills, as there aren't many globally imperiled or federally listed species found in the ecoregion. Groves *et. al.* (2000a) also suggest that teams include **species of special concern** within the ecoregion to capture declining, endemic, disjunct or vulnerable species. Most of the targets in the Black Hills fit into this third category, including many peripheral and widely-disjunct populations.

The planning team met to select conservation targets in June 1999 at Devils Tower National Monument WY. South Dakota and Wyoming Natural Heritage databases were queried to develop a preliminary list of imperiled, federally endangered and threatened species, and vulnerable species (ranked G3) occurring in the ecoregion. Additionally, species on the US Forest Service Sensitive Species list for Region 2, which includes the Black Hills National Forest, were considered for targets. State rare species that are tracked by both state Heritage Programs that are of concern in the ecoregion were also considered, as there are many disjunct and peripheral species that are regionally rare, though globally secure.

The target list was refined over the course of the planning process, incorporating new information and expert review. The final products include two lists of conservation targets: primary targets and secondary targets. **Primary targets** are of most concern in the ecoregion, and it is based on these targets that portfolio sites are to be selected. Primary targets also include all terrestrial ecological systems, aquatic systems and natural plant communities, as discussed previously. In evaluating the potential list of primary species targets, the team included most plants listed USFS Region 2 Sensitive Species and all imperiled and vulnerable plant and animal species and subspecies found in the ecoregion. Also included as primary targets were state rare and endemic, disjunct and peripheral species in the Black Hills. **Secondary targets**, although of concern in the ecoregion, are not sufficiently vulnerable to justify site selection for protection of the species alone, but are important to consider when evaluating the success of the coarse filter and of the overall portfolio in meeting conservation goals. Secondary targets could one day be at serious risk in the ecoregion.

The target lists and detailed justification for the selection of each species is included in Appendix 2 (plants) and Appendix 3 (animals). It should be noted that in some parts of the Black Hills, mainly at lower elevations, lack of survey precluded the development of a complete list of potential targets. Future iterations of ecoregional planning in the Black Hills should target these areas for survey.

During the course of ecoregional planning, two additional groups of species were discussed: candidate target species and wide ranging mammals. Candidate targets include: *Carex rosea, Pellaea gastonyi, Selaginella rupestris, Adenocaulon bicolor* and *Luzula acuminata.* Although these species have come to the attention and concern of state Heritage Programs and researchers in the Black Hills,

there is currently insufficient information on hand to warrant primary or secondary species target status. These species will be considered candidate targets until more information is available. During future iterations of Black Hills ecoregional planning, these species should be reevaluated.

There has been increasing concern about the needs of wide-ranging mammals, especially carnivores, in the western United States. The wide-ranging mammals that occur in the Black Hills are elk, mountain lion, black bear and bighorn sheep. The planning team did not feel that there was enough conservation concern in the Black Hills for these species to make them conservation targets. All four species are currently managed as game species by state agencies in WY and SD. These species have large global distributions and populations, fairly flexible habitat requirements, and are increasing both regionally and ecoregionally (Backlund and Beauvais 2000, pers. comm. with J. Hall). Bighorn sheep are not native to the ecoregion, and there are recent efforts to increase the population through introduction (South Dakota Department of Game, Fish and Parks 2001). For these reasons, wide-ranging mammals were not included as conservation targets for the Black Hills.

Conservation Goals

The planning team assembled the known information on distribution, abundance, habitat, and sensitivity for all target species. The results of this literature search and expert consultation indicated that for some species, basic knowledge such as habitat characteristics, distribution within the ecoregion, and current and potential threats is lacking. Numeric conservation goals *were* assigned that represent a "best guess" based on the current state of knowledge and as an attempt to start the conservation process in the Black Hills. The conservation process is an iterative process, and as more information is gathered about the target species, conservation goals should be refined to better serve the conservation needs of the rare species on the target list.

Plants. Because better information could not be found for most of the plant targets, the general guidelines recommended by Groves *et. al.* (2000a) were followed, slightly modified due to the significantly smaller size of the Black Hills ecoregion compared to an average-sized ecoregion in the United States. The conservation goal, therefore, for plant targets is *to protect at least five viable occurrences* within the range of the species in the Black Hills. There are several plants on the target list where there are less than five known examples in the ecoregion. In fact, there are 5 plants that have only **one** known occurrence. In this case, the goal is to *protect the known occurrences and to support survey* to identify additional occurrences. Specific discussion about the conservation goals for each plant target can be found in Appendix 2.

Animals. Animal conservation goals were developed with similar methodology to the goals set for plant communities. A matrix was developed indicating the goals based on distribution within the ecoregion and the degree of habitat specialization (Table 2). The numbers apply to either patches of suitable habitat for vertebrates or populations of invertebrates. Specific discussion about the conservation goals for each animal target can be found in Appendix 3.

For most vertebrates, a minimal viable population is best expressed in terms of area of suitable habitat. Therefore, the conservation goals for vertebrates are expressed in the number and size of "patches" of appropriate habitat that should be encompassed by portfolio sites. Ideally, these patches should include known occurrences. However, in cases where there is a paucity of occurrence data for some taxa, some patches may have to encompass suitable habitat only, with the assumption that the target taxon is present within. The minimum patch size is the estimated contiguous area of

appropriate habitat necessary to support a population of 200-275 individuals (Groves *et. al.* 2000a). This is usually based on estimates of population density and/or home range size.

Table 2. General guidelines used in setting conservation goals for animal species in the Black Hills, based on rangewide distribution and habitat specialization. The numbers apply to either patches of suitable habitat for vertebrate species or populations of invertebrates.

	Strong Habitat Specialization	Medium Habitat Specialization	Weak Habitat Specialization
Ecoregional Endemic	8-10	6-8	6
Regional Endemic	6-8	6	4
Disjunct	6	4	3
Widespread	3	3	3
Peripheral	3	3	3

It is possible to derive suitable habitat from state GAP land cover maps by ranking, from 0-4, each cover type according to its habitat suitability for each species (analysis by G. Beauvais). An index could then be calculated using the rank and proportional coverage of primary, secondary, and "other" cover types, such that:

Index = (primary rank * primary coverage) + (secondary rank * secondary coverage) + (other rank * other coverage)

GAP cover type data were not available for SD during the planning effort. Suitable habitat patches were identified for vole, squirrel, goshawk, longspur, and woodpecker targets in WY. However, because a comparable data set couldn't be assembled for SD, the planning team decided to base site selection on number of occurrences, rather than suitable habitat patches. In future iterations of Black Hills ecoregional planning, the planning team would highly recommend using suitable habitat patches across the entire ecoregion for vertebrate targets.

It is not possible to define suitable habitat using GAP cover types for invertebrate targets, given that these species depend on very specific and definable habitat. The conservation goals for invertebrates are based on survey occurrence, rather than number of patches.

Viability Assessment. Similar to plant communities, viability should be assessed for plants and animals using the factors of size, condition, and landscape context In general, it was very difficult for the team to assess the viability of many of the targets in the Black Hills. Viability ranks had not been assessed for many occurrences. In some cases, the Heritage Programs know only that the species is rare and should be tracked, but not much else about the quality of the documented occurrence or about the life history and habitat of a given species to confidently assess the viability of the occurrence. There was not sufficient time and resources during this ecoregional planning process to revisit those occurrences and assign an element occurrence rank. In most cases, Heritage Programs assigned a general eorank of "E" to some target occurrences, indicating that the occurrence is extant, but the viability is unknown.

To make certain that targets found within sites in the ecoregional portfolio have a high likelihood of remaining extant, only viable occurrences are typically included in the ecoregional analysis. Because this information was lacking for many of the targets in the Black Hills and due to the extreme rarity of some of the target occurrences, the planning team felt it was necessary for conservation purposes to include occurrences with questionable viability in the ecoregional analysis. It is the hope of the

planning team that the sites containing these species will demonstrate that research on viability is important for the efficiency and efficacy of conservation planning.

SPATIAL STRATIFICATION

To better encompass ecological variation in habitat, to represent the range of variability of targets, and to protect targets from disturbance events, the Black Hills ecoregion was divided into planning units (Figure 3) and conservation goals assigned by planning unit where appropriate. This **spatial stratification** attempts to create units at a scale appropriate to major variations in vegetation in the Black Hills.

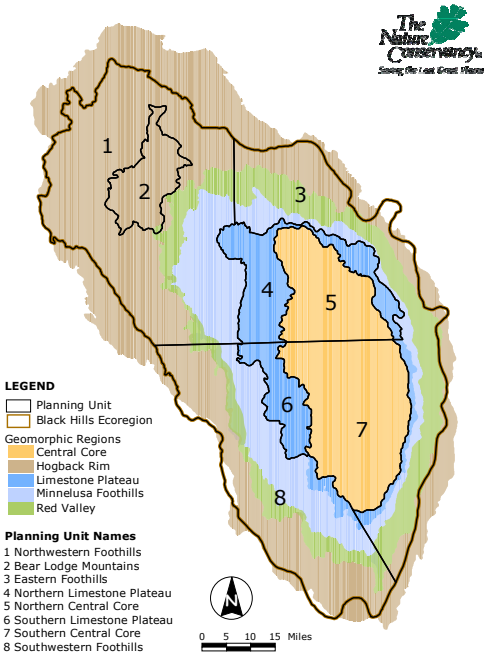

Figure 3. Planning Units defined for the Black Hills Ecoregion. These planning units were used to spatially stratify conservation targets to better encompass ecological variation in habitat, to represent the range of variability of targets, and to protect targets from disturbance events.

In other ecoregional planning efforts, teams have stratified ecoregions based on the US Forest Service section or subsection units (Anderson *et. al.* 1999). There are only two subsections in the Black Hills ecoregion—and, given the level of information known about community types and occurrences in the ecoregion, a finer level of stratification was required.

The 8 planning unit stratification that was developed by the planning team is based in part on a system of geomorphic subdivisions for the Black Hills developed by Darton (1925) and modified by Froiland (1990). Their five subdivisions have been combined into three units for this analysis: Central Core, Limestone Plateau and the lower elevation Foothills (equivalent to the Minnekahta Foothills, Red Valley and Hogback Rim geomorphic subdivisions). In general, the Central Core is surrounded by concentric rings formed by the other units. However, the Limestone Plateau is asymmetrical, and is not well developed on the south and east sides of the Central Core. Limestone Plateau thus refers to the extensive high plateau west and northwest of the Central Core. The Hogback Rim subdivision, part of the lower elevation Foothills unit, also is strongly asymmetrical. It is represented by relatively-narrow zones of steeply tilted hogbacks on the east, south and southwest flanks of the Black Hills. In the northwest part, the strata dip gently, forming an extensive dissected plateau-like region sometimes called the Hogback Plateau.

In order to capture variation between the wetter northern and drier southern Black Hills, the Central Core and Limestone Plateau were divided along an east-west line running from Rapid City SD, through Four Corners WY (Froiland 1990). The extensive lower elevation Foothills unit was divided into three planning units: Northwest Foothills, which includes the Hogback Plateau (mostly in WY), Southwest Foothills (from Four Corners south and east to Hot Springs SD) and Eastern

Foothills (from Hot Springs SD northwest to the state line). Finally, the high Bear Lodge Mountains, a minor uplift superimposed on the Hogback Plateau, are treated as a separate unit. Although some dividing lines have been drawn for convenience only, the planning units are essentially based on geology and topography, and attempt to represent the distribution of biodiversity in the ecoregion.

Site Distribution

Protecting a given number of conservation sites alone does not necessarily ensure viability. Sites should be distributed across the range of the target within the ecoregion to include genetic and habitat diversity. Distribution across the ecosystem is most important for endemic species and endemic and limited plant community types.

Known distributions of Black Hills plant communities by ecoregional planning unit are given in the table in Appendix 1. Known distribution of Black Hills plant and animal species are given by species in Appendix 2 (plants) and Appendix 3 (animals).

Plant Communities. The following spatial guidelines were used in selecting conservation sites for plant communities. Site distribution was modified in some cases to favor A-ranked occurrences.

[1] An endemic community should be represented by at least one conservation site in each ecoregional planning unit where it occurs. For a type with a conservation goal significantly greater than the number of planning units constituting its range, as many planning units as possible should include at least two conservation sites. For example, the Black Hills montane grassland community, a large patch endemic type with a conservation goal of nine sites, occurs in four planning units. At least two sites should be chosen for each of these planning units if viable occurrences are present.

[2] A limited community should be represented by at least one conservation site in every planning unit where it occurs, but not in excess of the conservation goal. For example, ponderosa pine/chokecherry forest, a large patch limited type with a conservation goal of four sites, is widely distributed in the Black Hills, and may occur in all planning units. The four conservation sites chosen for this type should be in four different planning units.

[3] For all other communities, sites should be as widely distributed within the region as possible based on existing element occurrences, occurrence quality and project feasibility.

Plant and Animal Species. Most of the species targets have a very limited distribution in the Black Hills, and so stratification goals generally were based on known species distribution. For some vertebrate taxa with larger ranges and less specific habitat requirements (e.g. bats and birds), it was not necessary to differentiate between the Foothills planning units and the Limestone Plateau and the Central Core. In these cases, goals are expressed in terms of a number of occurrences in at least one foothills planning unit and a number of occurrences in a non-foothills planning unit. For some very rare plant species and invertebrates, there was not enough known about habitat requirements or potential distribution to develop stratification goals. In these cases, the goal is to protect all known occurrences of the target. Finally, it may be important in some cases to forego the suggested spatial distribution in order to capture high-quality documented occurrences.

IV. AQUATIC ECOREGIONAL ASSESSMENT

Similar to the terrestrial ecoregional assessment, the aquatic assessment relied heavily on the assumption that common species will likely be protected through conservation of ecological systems and natural communities.

Assessing the ecological patterns within the ecoregion aided in the development of an aquatic conservation plan for the Black Hills. The ecoregions being used by TNC are modifications of the USDA Forest Service ecoregions (Bailey 1995), and are representative of distinct ecological patterns within broad regions of similar climate, geology, and landform. Identifying the suite of priority aquatic conservation sites that will represent an ecoregion's aquatic biodiversity requires a comprehensive picture of aquatic ecosystem and biological diversity. However, many ecoregions have limited, or currently unavailable spatially-referenced information about the distribution of aquatic species, and most, generally lack data on natural aquatic assemblages.

Environmental gradients of climate, elevation, and geology shape aquatic ecosystems at several spatial scales, and the influence of the physical habitat on the diversity of aquatic species and communities *has* been well documented. Based on these relationships, The Freshwater Initiative program of TNC developed a method to create an approximate comprehensive picture of *potential* aquatic community diversity across the Black Hills. This method is based on a standard methodology developed by Higgins *et. al.* 1999. Spatial data were used to describe units of aquatic ecosystems in terms of the regional driving factors that influence community distribution and composition. This classification approach has already been used to classify streams and lakes in other ecoregions. Once the potential diversity and distribution of aquatic communities and systems within the ecoregion is determined, a quality assessment is performed and reviewed by experts to identify the highest quality examples of the different communities and systems. If no high quality communities or systems are remaining, the best areas for restoration are identified.

DEFINING AQUATIC CONSERVATION TARGETS

The first step in the aquatic classification is to identify macrohabitat units. **Macrohabitats** are units of streams and lakes that are relatively homogeneous with respect to size, and thermal, chemical, and hydrological regimes. Macrohabitats correspond to the spatial extent of potentially distinct biological communities. Stream macrohabitats were mapped in the Black Hills ecoregion based on three primary spatial data sets: hydrography, geology, and elevation.

Macrohabitats are often too fine in scale to be meaningful for conservation planning purposes. However, macrohabitat classification is a useful step in the process in that it aids in the classification of **aquatic ecological systems** – a unit much more useful for conservation planning. Aquatic ecological systems are dynamic spatial assemblages of multiple ecological communities that: [1] occur together in an aquatic landscape with similar geomorphological patterns; [2] are tied together by similar ecological processes (e.g., hydrologic and nutrient regimes, access to floodplains and other lateral environments) or environmental gradients (e.g., temperature, chemical and habitat volume); and [3] form a robust, cohesive and distinguishable unit on a hydrography map. Aquatic systems are defined by looking for patterns in the distribution of macrohabitats and in the physical spatial data, as well as incorporating expert information about the ecoregion. There are 12 aquatic system targets identified for the Black Hills (Figure 4, Appendix 4).

Identifying Macrohabitats

With expert input, six stream variables were derived from the hydrography, geology, and elevation data layers to assist in the classification of macrohabitat units: stream size, connectivity (network position), percent of intermittent stream miles upstream of the reach, intermittent or perennial, gradient, and hydrologic regime. Lines representing stream reaches were attributed both automatically and manually in a GIS and grouped into macrohabitats based on these variables. Macrohabitat types were defined for the Black Hills as unique combinations of the classification attributes described below.

Hydrography. A stream map was analyzed to describe two important variables: size and connectivity. Four stream size classes were defined based on link number, a count of the number of first order streams upstream of a point. The classes are: headwater (link 1-5); creek (link 6-30); small river (link 31-450); large river (link >450). Stream connectivity describes the position in the drainage network, measured as the link number of the downstream reach. Because over 75% of the stream reaches in the Black Hills are intermittent, 2 additional attributes were included for further refinement. The first is the percent of stream miles above the reach that are intermittent, and the second identifies the reach as either intermittent or perennial.

Topography. Gradient was the only topographic factor that was measured. Gradient is the change in elevation of a stream reach over its length. It is a useful single measure of channel morphology because it is correlated to sinuosity, pool-riffle pattern, confinement, substrate size, and water velocity. The gradient for each stream reach was calculated automatically from a digital elevation model (DEM) in a GIS, then averaged for each macrohabitat. Rosgen's (1994) five gradient classes was used to classify the macrohabitats: anastomosing (<0.005 when on a large river), low gradient (0.005 and <0.02), moderate gradient (0.02 and <0.04), steep (0.04 and <0.10), and very steep (>0.10).

Geology. Surficial geology texture and topography were used to infer the hydrologic regime of each stream macrohabitat in terms of relative inputs of ground and surface water. The surficial geology of the Black Hills is concentric and not highly variable, but the large areas of limestone result in a complicated hydrologic regime. Generally, the highest ground water inputs occur from large springs at the juncture of the Minnekahta limestone formation and the Spearfish formation (Miller and Driscoll 1993). The hydrologic regime was classified for macrohabitats by assigning the hydrologic regime of the primary geology that the stream segment intersected.

Identification of Ecological System Types

Within the small ecoregion of the Black Hills, there are ranges in types of aquatic ecosystems. Ecological systems summarize the range in macrohabitat types for sets of hydrologically-connected streams and are a much more useful target for conservation planning. Each system type represents a different pattern of physical settings thought to contain a distinct set of biological communities and is therefore a distinct conservation target. Patterns in the six attributes and in the macrohabitat types were used to identify ecological system types. In addition, it was necessary to consider several other attributes in the system classification. The influence of upstream geology and topography on downstream hydrology was addressed. The hydrologic regime for systems was classified using gaging data results from Miller and Driscoll (1993) and by grouping subwatersheds with similar geologic and topographic characteristics. Systems were classified as stable, moderately stable, or unstable. Also, several streams in the southern portion of the ecoregion are influenced by hot springs, resulting in two distinct systems that are thermally influenced – Fall River and a group of intermittent tributaries that include Hot Brook.

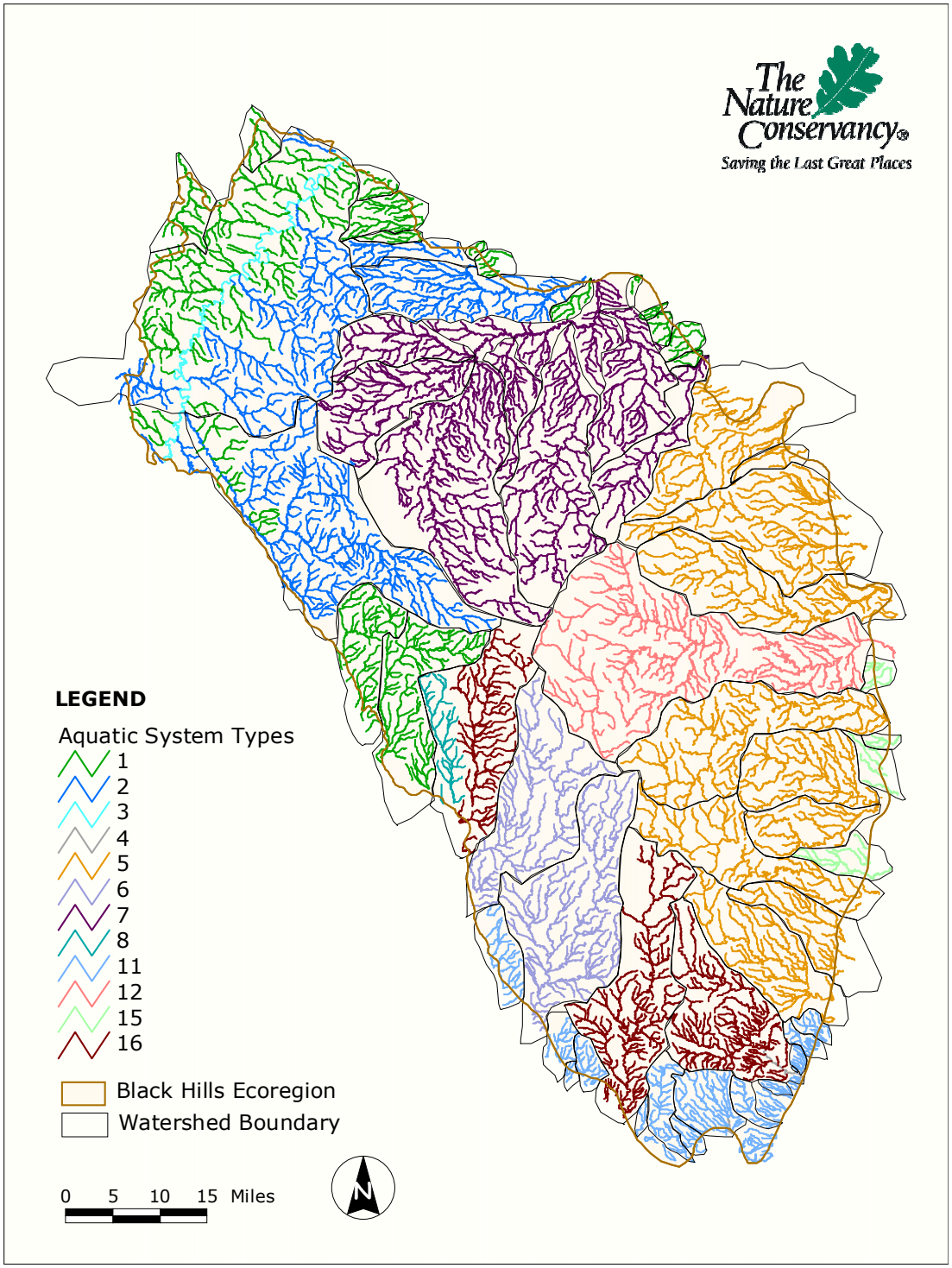

Figure 4. Aquatic system types of the Black Hills Ecoregion.

Figure 4 shows the different stream types and Appendix 4 identifies and describes different system types within the Black Hills ecoregion. Each subwatershed that is the same color usually contains multiple examples of parts of each system. For example, a subwatershed will have many headwater (HW) and creek size streams, but usually only one example of a small river. The resulting ecoregional sites may only capture the headwaters of a system, not the complete system.

Aquatic Species Targets

Aquatic species targets were included in the terrestrial assessment of species. However, target occurrences were identified by select experts in the ecoregion.

SETTING CONSERVATION GOALS AND ASSESSING VIABILITY

Currently, there is little information about the aquatic ecological systems in the Black Hills to set conservation goals and assess viability. Instead, a goal was set to identify the highest quality example(s) of each system type.

In order to identify the highest quality example of each system target, an **Aquatic Suitability Index** (ASI) was developed to reflect the overall (average) quality of the contributing catchment to a segment of river. Factors such as density of roads, percent of converted land, number of roads, dams, degraded streams, and point pollution sources served as the focus of the index. Each factor was given equal weight in the overall score, such that the maximum value of the index is 1 and the minimum value is 0. Each factor was also scaled individually from 0 to 1 according to the maximum value for that particular variable. The ASI is reflected in the following equation:

ASI = a+b+c+d+e

where:

a = 0.2 * [1 – (density of roads in contributing area /maximum density)][1]
b = 0.2 * [1 – (% of land converted in contributing area/maximum percent)][2]
c = 0.2 * [1 – (# of dams per length of stream reach in contributing area/maximum number of dams per length of stream)][3]
d = 0.2 * [1 – (length of degraded streams per length of stream reach in contributing area/maximum length of degraded streams per length of stream)][4]
e = 0.2 * [1 – (# of point sources per length of stream reach in contributing area/maximum number of point sources per length of stream)][5]

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[1] The density of roads was measured by dividing the length of road in the reach's contributing area by the contributing area. A proportion was derived by dividing the density by the greatest density found for any reach.
[2] The percent of land converted in a subwatershed was calculated by determining which categories in the land use represented converted land. The area of converted land was then divided by the total contributing area. A proportion was derived by dividing this value by the greatest percent of converted land found for any reach.
[3] The total number of dams per length of stream reach were measured using digital data available from the U.S. Army Corps of Engineers. The number was scaled per length of reach by dividing it by the greatest value found for any reach.
[4] The density of degraded (EPA's 303d listed) streams (data from Lonnie Steinke, TMDL Coordinator, SD DENR) was calculated by dividing the length of degraded streams by the total length of streams in the contributing area. A proportion was then calculated by dividing this number by the greatest density found for any reach.
[5] The number of point source discharges were measured using data from EPA's BASINS CD and USGS mine locations. Each number was divided by the total length of streams in the contributing area to standardize values, and then changed into a proportion by dividing this number by the greatest value found for any reach.

The ASI provided a preliminary assessment of quality for review by the planning team and experts. The planning team held an aquatic experts meeting near Spearfish Canyon SD in June 2000. In addition to the planning team, representatives were present from the SD Department of Environmental Quality, SD Game and Fish Department and the Black Hills National Forest. Experts not able to attend submitted their comments by phone or email. A complete list of the aquatic experts consulted during the planning process can be found in the Acknowledgements section. The experts received the preliminary aquatic classification and set of high quality occurrences prior to the meeting. Based upon the expert knowledge of the ecoregion, the classification was refined and high quality occurrences recommended for site selection.

V. Ecoregional Conservation Design

The ultimate goal of every ecoregional planning effort is the identification of a **portfolio of conservation sites** that are intended to conserve the native species, ecological communities, and systems of an ecoregion provided they are managed appropriately (Groves *et. al.* 2000a). There are six principles inherent in the design of the portfolio of conservation sites:

- The portfolio of conservation sites should represent all coarse-scale targets.
- Multiple examples of all conservation targets should also be represented in the portfolio across the diversity of environmental gradients in the ecoregion.
- Priority is given to coarse-scale target occurrences during the site selection process as these areas are likely to contain other finer-scale targets.
- Areas that contain high-quality examples of both aquatic and terrestrial targets are also given priority.
- Conservation sites should be functional – in other words, maintain the size, condition and landscape context within the natural range of variability of the conservation targets.
- The final portfolio should also aim to capture all targets.

The conservation process followed by The Nature Conservancy (discussed in Section I) works at two different scales, the ecoregion and the site. The concept of a "**site**" is used at both scales, but with somewhat different meaning. The sites delineated in ecoregional planning, including the Black Hills planning process, are better thought of as **areas of biodiversity significance**, and not functional conservation sites as defined in the site conservation planning process (The Nature Conservancy 2000). During the next step of the conservation process, site conservation planning, the ecoregional site boundaries should be refined to ensure that each site is an area that maintains the targets and their supporting ecological processes within their natural ranges of variability.

In the Black Hills ecoregion, areas of biodiversity significance were delineated which represent the most important areas for biodiversity conservation, including the entire set of areas needed to conserve or restore the conservation targets. These sites were selected regardless of current ownership or management status. This portfolio of conservation sites will direct the activities of The Nature Conservancy in the Black Hills, as well as assist public management agencies in management practices.

IDENTIFYING AREAS OF BIODIVERSITY SIGNIFICANCE

Aquatic Priority Site Selection

The Aquatic Suitability Index (ASI) provided a preliminary draft set of ecoregional sites, representing the highest quality occurrences of each system type. Individual catchments within each watershed were analyzed, and the relative poorest quality areas within them were ruled out. A preliminary list of priority sites was then compiled by choosing areas with the greatest number of high quality reaches and the lowest number of poor quality reaches. As mentioned in Section IV, each subwatershed contains examples of different parts of each system. For example, a subwatershed will have many headwater- and creek-sized streams, but usually only one example of a small river. As a result of the size and quality of some of the systems, the selected priority sites do not always capture a complete system, but sometimes only the headwater- and creek-sized streams of a system (Figure 5).

Aquatic experts participated in the site selection process at the expert workshop held in June 2000. It was useful to have provided a draft set of sites to the experts for their comment. The experts agreed that many of the preliminary sites were the best examples in the Black Hills, but recommended several changes to this first round list of aquatic sites, and the resulting aquatic portfolio was largely the result of expert comment, rather than data inputs. It is important to note that experts did not always pick the highest quality habitats for sites because many of the high quality areas have been stocked with non-native trout. Native fish communities have been forced to survive in poorer quality habitats that are too harsh for the non-native trout. Some of these poor quality areas have great potential for restoration and were nominated as portfolio sites.

Terrestrial Priority Site Selection

The planning team held a terrestrial site selection meeting near Spearfish Canyon SD in June 2000 to identify areas of biodiversity significance based on all target occurrence and viability information. Representatives from all the major public landholding agencies were invited to the meeting as contributors and are listed in the Acknowledgements section. The team established several guidelines to follow during site selection. First, the team recognized that there is conservation efficiency in defining sites which harbor viable or restorable examples of multiple targets. Second, drawing larger boundaries around several smaller sites could possibly restore landscape connections that have been lost over time. This is very important for coarse-scale targets. However, drawing larger site boundaries without landscape connections only dilutes the intended conservation purpose of a given target, especially for small scale, localized targets.

The first sites chosen were all those areas containing examples of the terrestrial ecological systems. The next step in the site selection process was to identify areas with viable or restorable examples of plant associations not already captured by the known system occurrences. Information came mainly from the BHCI database of element occurrences, in addition to a smaller set of occurrences stored in state Natural Heritage databases. The final step was to define areas that capture viable or restorable examples of species targets not already found within sites based on occurrences of the system and community targets.

In some cases, priority areas represent existing management boundaries or slightly modified management boundaries. In other cases, sites were drawn by experts around viable occurrences of the conservation targets. These sites are represented by wavy lines to indicate the approximate nature of the placement of the lines. In any case, the boundaries shown in Figure 5 represent only

an approximation of where important areas of biodiversity occur within the ecoregion and do not in any way represent an area for future management by The Nature Conservancy or other parties.

Several areas were selected as both terrestrial and aquatic based sites. These areas contained the best examples of both aquatic system targets and terrestrial targets and it was felt that the conservation activities used in these sites would benefit both types of targets. However, in cases where terrestrial sites overlapped aquatic sites by only a small area, they were left as separate but overlapping sites, as two types of sites demand a different focus because strategies for conservation will differ greatly.

A GIS was used to draw all the site boundaries. In some cases, site boundaries were taken from existing management units (for example, late successional landscapes managed by the Black Hills National Forest). Digital raster graphics (DRGs) representing 1:100,000-scale topographic quads were projected onto a screen and a mouse was used to digitize site boundaries directly in the GIS. The GIS proved extremely useful and efficient in the site selection process. Several site boundaries were later refined to better represent the needs of the conservation targets.

Agency Participation

Almost half of the Black Hills ecoregion is in public ownership, and representatives from Federal and State agencies were regularly invited to participate in stages of ecoregional planning. Many public land managers were interested in The Nature Conservancy's ecoregional planning process, and periodically received updates throughout planning efforts in the Black Hills. However, no agency staff could be directly involved in the process due to Federal regulation.

Although the team collectively was very knowledgeable about targets and landscapes of the Black Hills, information provided by agency staff was quite helpful in site selection. Additionally, many of the selected conservation sites are on public land, and agency awareness is an important factor in the conservation process.

BLACK HILLS ECOREGION CONSERVATION DESIGN

A map of the final portfolio of conservation sites is shown in Figure 5. Included are 40 areas of known biodiversity significance – 8 aquatic sites, 7 terrestrial/aquatic sites and 25 terrestrial sites. The sites range in size from Eagle Cliffs (183 acres, 0.29 sq. miles) to Cheyenne River Canyons (103, 883 acres, 162 sq. miles). The total area of all sites is 821,390 acres or 25% of the ecoregion. This percent is very close to other ecoregional plans completed by The Nature Conservancy. Descriptions of each site, ownership, and targets captured are presented in Appendix 5.

Evaluating the Design

The success of the portfolio is measured by how well it captures viable occurrences of conservation targets and meets the conservation goals. Overall, the portfolio of conservation sites was successful in capturing at least one example of each target (Figure 6, Appendix 6). This analysis represents only known occurrences of conservation targets. Site conservation planning and future iterations of Black Hills ecoregional planning will be gathering information about these sites, hopefully gaining a better picture of what occurs at each conservation site.

Aquatic System Targets. The conservation goal for aquatic systems was to capture at least one example of each system type in the final portfolio. This goal was exceeded by capturing at least one and sometimes more than one example of several of the system types.

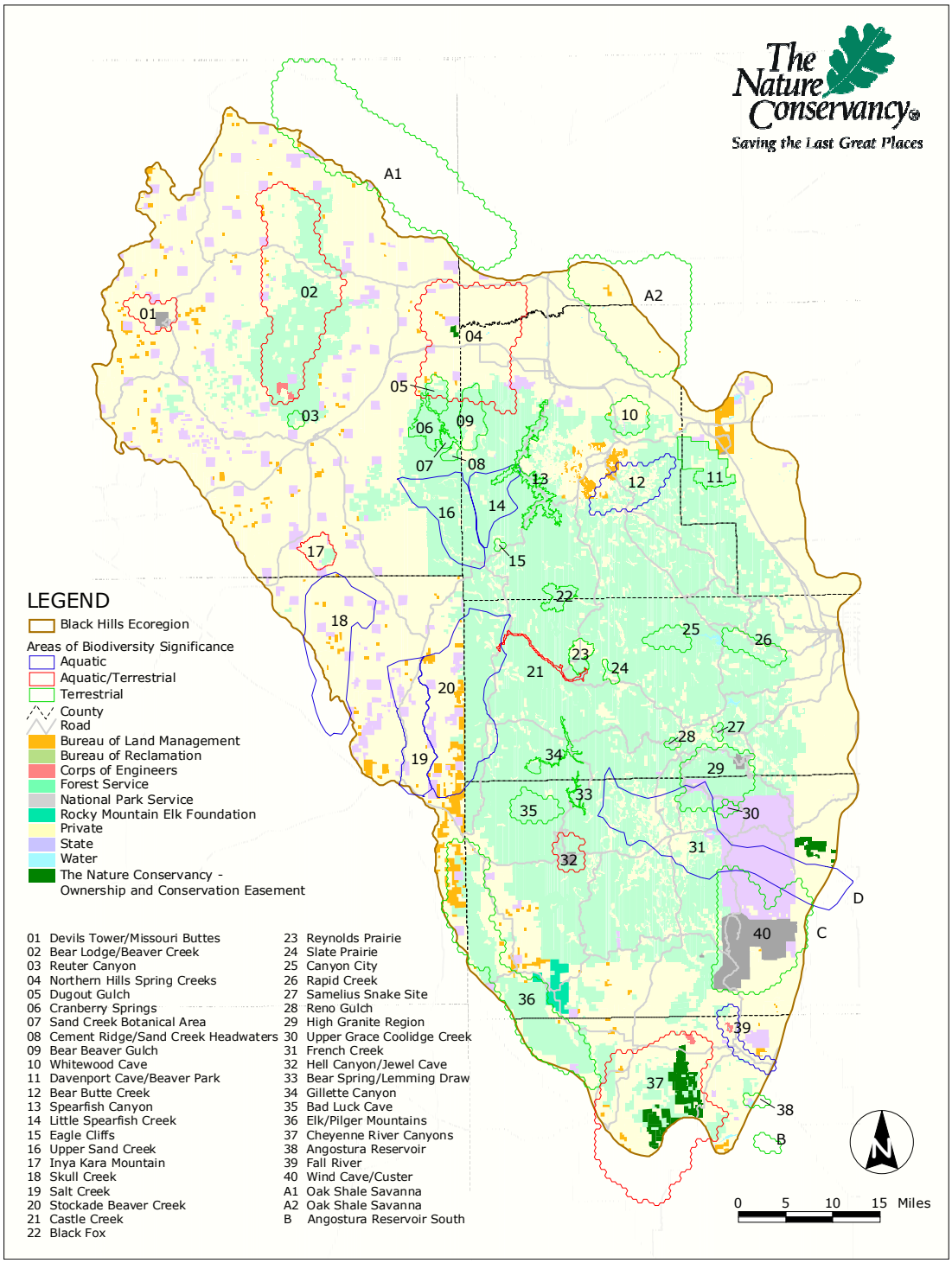

Figure 5. Areas of biodiversity significance (portfolio of conservation sites) in the Black Hills Ecoregion. This figure also shows the ownership composition of the ecoregion. Aquatic sites are drawn around watersheds or subwatersheds. Terrestrial sites represent existing management boundaries, slightly modified management boundaries, or expert drawn polygons around viable occurrences of the conservation targets (represented by wavy lines). In any case, the boundaries shown in this figure represent only an approximation of where important areas of biodiversity occur within the ecoregion and do not in any way represent an area for future management by The Nature Conservancy or other parties.

Coarse-scale Terrestrial Targets. The goal for each system type was to identify the highest quality occurrences, defined by size and condition, of each system target. Although it was challenging to develop size and condition ranking standards for the system targets (as discussed in Appendix 1), the occurrences captured by the conservation sites are felt to be the largest and of the highest condition. The site boundaries drawn to capture ecological system targets attempted to capture the entire extent of the occurrences. The sites range from 1x to 917x larger than the minimum size criteria for each system type (Table 3).

Table 3. Minimum size criteria and site size for terrestrial ecological systems.

System Type	Minimum size criteria	degree larger
Sites representing system type	*occurrence size*	than minimum size
Ponderosa Pine Forest System	2500 acres	
Bear Lodge/Beaver Creek	*79598.14*	32
High Granite Region	*22935.032*	9
Cranberry Springs	*7171.69*	3
Hell Canyon/Jewel Cave	*4373.652*	2
Ponderosa Pine Woodland System	2500 acres	
Cheyenne River Canyons	*103883.234*	42
Elk/Pilger Mountains	*66087.804*	26
Wind Cave/Custer	*59723.471*	24
Hell Canyon/Jewel Cave	*4373.652*	2
Devils Tower/Missouri Buttes	*6547.446*	3
Upland Aspen System	500 acres	
High Granite Region	*22935.032*	46
Bear Lodge/Beaver Creek	*79598.14*	159
Cranberry Springs	*7171.69*	14
Prairie System	500 acres	
Devils Tower/Missouri Buttes	*6547.446*	13
Wind Cave/Custer	*59723.471*	119
Cheyenne River Canyons	*103883.234*	208
High Elevation Wetland System	25 acres	
High Granite Region	*22935.032*	917
Upper Grace Coolidge Creek	*488.659*	20
Black Fox	*4519.899*	181
Low Elevation Floodplain System	5 stream miles	
no sites		0
High Elevation Riparian System	5 stream miles	
Black Fox	*6.78 stream miles*	1
High Granite Region	*49.09 stream miles*	10
Spearfish Canyon	*47.15 stream miles*	9
Canyon City	*10.64 stream miles*	2
Little Spearfish Creek	*31.81 stream miles*	6

The success of the portfolio design with respect to ecological systems can also be evaluated by analyzing the portfolio's effectiveness in capturing plant communities. The Ponderosa Pine Forest system type was the only system in which all component plant associations met or exceeded the conservation goals (Appendix 6). Community associations in the Ponderosa Pine Woodland and Upland Aspen systems met or exceeded all goals when it was possible to do so. There are many plant associations for which there are insufficient known occurrences to reach the goals that were set. More than 50% of the plant associations in the other system types met their goals. There is a need for further inventory within portfolio sites to determine what viable examples are captured.

Overall, the portfolio captured 92% (58 out of 63) of the plant community targets (Figure 6, Appendix 6). Of those, 40% (25 out of 63) of the plant community targets met or exceeded the stated conservation goals (Figure 7). However, it was not possible for each community association to meet the stated conservation goal. Thirty-three percent (21 out of 63) of the associations had insufficient numbers of known occurrences to meet stated conservation goals and 8% (5 out of 63)

have no documented occurrences in the Black Hills. Therefore, a few other statistics can be helpful in examining how successful the portfolio was in capturing the diversity of community association targets across the ecoregion. All known occurrences were captured for 38% (24 out of 63) of communities and overall, the portfolio captured the stated conservation goal of target occurrences or captured all known occurrences for **78%** (49 out of 63) of community targets. This more realistic view of the portfolio's success in capturing targets can be seen in Figure 8. Appendix 6 lists each community target, portfolio sites selected for that target, and the element occurrence rank of each occurrence.

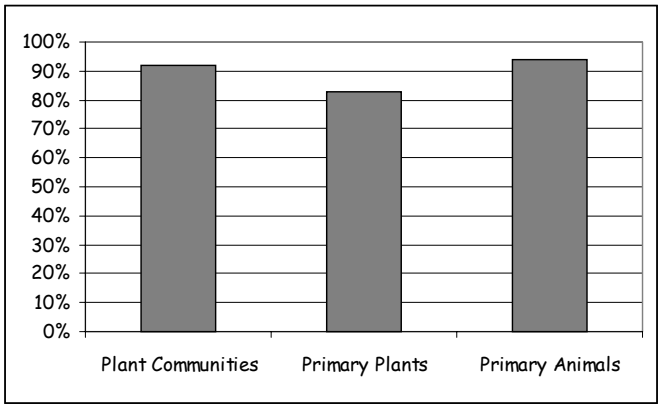

Figure 6. Percent of targets captured by portfolio.

Plant community targets were selected from different planning units when possible to stratify occurrences across the range of diversity in the ecoregion. The portfolio was successful in meeting stratification goals for 38% (24 out of 63) of community targets. An additional 35% of community targets came within one or two planning units from meeting the stratification goal. Twenty-seven percent of community targets did not meet the stated stratification goal; however, many of these are communities that either have insufficient documented occurrences, or are limited in distribution within the ecoregion.

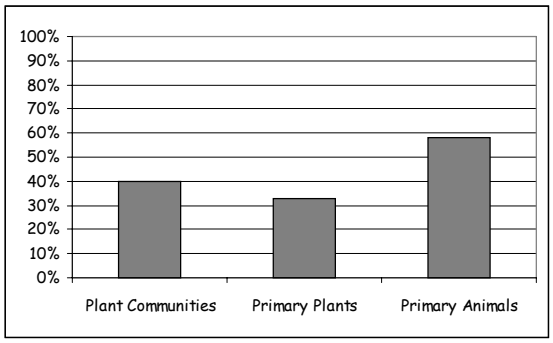

Figure 7. Percent of targets meeting conservation goals

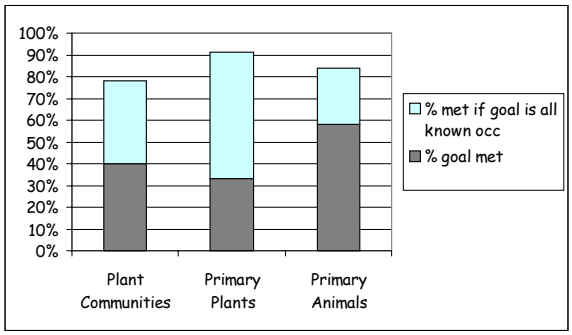

Figure 8. Percent of targets meeting conservation goals, including all known occurrences

Fine-scale Targets. The portfolio of sites captured 87% (10 out of 12 plants, 17 out of 18 animals) of the primary targets (Figure 6, Appendix 6). Of those, 33% (4 out of 12) primary plant targets and 58% (11 out of 19) primary animal targets met and/or exceeded their conservation goals (Figure 7). However, it was not possible for all species to meet the stated conservation goals. There are 5 plant species with a single known occurrence each in the Black Hills. In addition, there currently are no documented occurrences of the Mountain Sucker and the Atlantis Fritillary in the Black Hills, both of which are important conservation targets. For several other plant and animal

species, it was clear that stated conservation goals would not be met with known occurrences, but it was necessary to set goals higher than a single occurrence in order to accurately describe what is needed for long-term viability, and to encourage research on these very rare species. All known occurrences were captured for 58% (7 out of 12) of plants and 26% (5 out of 19) of animals. Overall, the portfolio captured the stated conservation goal of targets occurrences or captured all known occurrences for **91%** (11 out of 12) of plant targets and **84%** (16 out of 19) of animal targets. This more realistic view of the portfolio's success in capturing targets can be seen in Figure 8. Appendix 6 lists each target, portfolio sites selected for that target, and the element occurrence rank of each occurrence.

When choosing conservation sites for species targets, occurrences were stratified by planning units to capture the diversity across the ecoregion. Most primary targets were captured through the coarse-filter, and so special effort was not made in most cases towards selecting single occurrences for stratification purposes only. The portfolio was successful in meeting the stratification goals for 78% (7 out of 9) of the primary plant targets. This is very good considering that conservation goals were met for only 33% of plant targets. The portfolio was successful in meeting the stratification goals for 79% (15 out of 19) of the primary animal targets.

Secondary targets are an important consideration in the evaluation of the success of the overall portfolio in meeting conservation goals. If the portfolio doesn't adequately capture secondary targets, the portfolio isn't adequate in representing all biodiversity in the ecoregion. The portfolio of sites captured 84% (23 out of 27 plants, 9 out of 15 animals) of the secondary targets (Appendix 6). Of those, 33% (9 out of 27) of secondary plant targets and 53% (8 out of 15) of secondary animal targets met or exceeded conservation goals. For several secondary plant targets, there are either no extant occurrences, or the numbers of known occurrences are less than the stated conservation goal. By using predicted areas of potential habitat (from GAP-based models), it is likely that the secondary targets would come within 80-100% of meeting conservation goals. As discussed in Section III, such an analysis is not possible at this time as there is no consistent dataset for the entire ecoregion. Appendix 6 lists each secondary target, portfolio sites selected for that target, and the element occurrence rank of each occurrence.

Site Viability. Similar planning efforts by The Nature Conservancy (2000, Anderson 1999) have applied a concept called **minimum dynamic area** to site selection and the analysis of site viability. Because the viability of conservation targets is tied to the historic scale and frequency of large-scale processes (ex. fire), it is important to think of the geographic area needed to ensure survival or re-colonization following these stochastic events. This concept has been termed minimum dynamic area (Pickett and Thompson 1978).

The scale and frequency with which the primary natural processes historically occurred and the diversity of the systems with respect to biodiversity are used to assess the minimum dynamic area. Estimates have been made that the area required for the continuation of natural processes at their historic scale, while maintaining a mosaic of habitat in all structure classes for the full array of species in the ecoregion, is four or five times larger than the historic disturbance patch size. An estimate has also been made regarding the amount of area needed by bird and mammals using matrix community patches. This estimate has been made as 25 times the mean female home range (Anderson 1999) or the area required to sustain 200 individuals (The Nature Conservancy, Osage Plains/Flint Hills Prairie Ecoregional Planning Team 2000).

The concept of minimum dynamic area is very difficult to apply in the Black Hills ecoregion. Large-scale processes affecting the ecoregion are fire, insect epidemics, wildlife, and flooding. There is very little agreement regarding the historic scale or frequency of these events in the Black Hills making it difficult to estimate the minimum dynamic areas (see *Landscape-scale Ecological Processes* in Section II). However, all ecological system occurrences met or greatly exceeded the minimum stated size criteria for viability (Table 3). The planning team is confident that viability has been adequately addressed with current available information.

Additionally, by using the minimum dynamic area metric for site selection, the importance of certain areas within the landscape might be diminished. A significant portion of the ecoregion is already publicly managed for conservation (46%). Natural scale processes are still occurring in this managed landscape (ie. the Jasper Fire of 2000). However, only a small portion of these areas are managed for long-term biodiversity conservation. A very important goal of this planning effort is to identify the areas of biodiversity significance which represent the highest quality and least impacted occurrences of the ecological system targets.

As site conservation planning begins in the Black Hills and data gaps uncovered during this ecoregional planning process are filled, site boundaries will likely be revised to establish functional site boundaries. In future iterations of Black Hills ecoregional planning, new data about functional sites should be incorporated so that an adequate analysis of site viability can be made.

Jasper Fire. Four portfolio sites occur within the area where the Jasper Fire occurred (Figure 9): Gillette Canyon and Bear Spring/Lemming Draw (representing Black Hills montane grassland community occurrences), Bad Luck Cave (representing bat targets) and Hell Canyon/Jewel Cave (representing ponderosa pine and aspen vegetation types, and bat and woodpecker targets). At this time, the impact of the fire is not known. It is unlikely that the montane grassland occurrences were severely affected (Marriott 2001, pers. comm to J. Hall) and the Forest Service has committed to protecting these occurrences in the burn area from logging and roading activities (USDA Forest Service 2000). There are bat targets found at two of the burned sites. It is thought that the bats will use the burned areas for foraging and that there are enough snags in the surrounding area to provide adequate roosting and maternity habitat (USDA Forest Service 2000). The Hell Canyon/Jewel Cave site burned extensively. The black-backed woodpecker, a secondary target, prefers closed canopy areas for foraging and nesting so the Forest Service is proposing to leave adequate habitat during salvage operations (USDA Forest Service 2000). Degree of tree mortality and other impacts to vegetation are not known at this time, but it is likely that the landscape has been changed significantly. In any case, it would be difficult to argue that the biological values of the site have been destroyed given that the fire (including occasional catastrophic fire) is a natural landscape scale process in the Black Hills, and one which has been reduced significantly with human settlement.

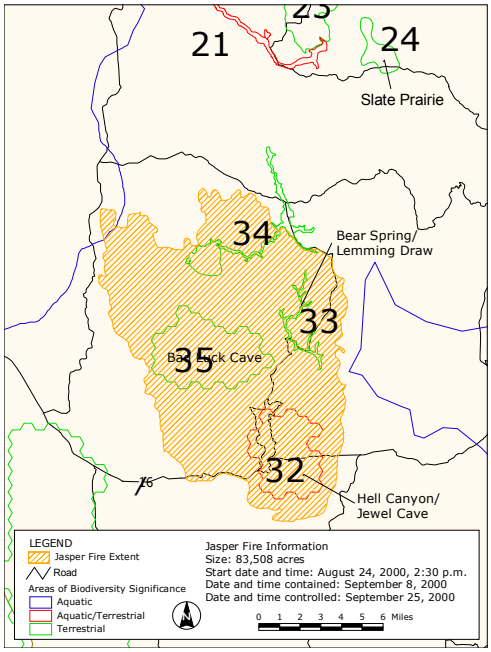

Figure 9. 83,508-acre Jasper Fire (August-September 2000). Map also shows the Black Hills portfolio sites affected by the fire.

Given the Conservancy's work on minimum dynamic area, it has been suggested that perhaps these 4 sites should have been one larger site. The planning team would not agree at this time. These four sites represent fine-scale species targets and small-patch communities, not matrix system types dependent on larger scale natural processes. In addition, this fire is not typical of the size of fire disturbance normally found in this ecoregion – the Jasper Fire was, by far, the largest fire known to occur in the Black Hills.

Managed Area Identification and Classification

A significant portion (46%) of the Black Hills ecoregion is publicly managed for some level of conservation. Public lands are managed by USDA Forest Service (38% of ecoregion), National Park Service (1%), Bureau of Land Management (2%), and the states of SD and WY (5%). The Bureau of Reclamation and Army Corps of Engineers manage small amount of the ecoregion (less than 1%). The remainder of land is in private ownership—mostly characterized by large ranches or small residential lots (Figure 5).

During the data collection phase of the planning process, the team assembled an electronic GIS managed area coverage at the scale of 1:100,000. The Bureau of Land Management offices in MT and WY provided much of this information for various ownership categories. These data were supplemented with information from the Black Hills National Forest Management Plan, SD Game, Fish and Parks Department, and The Nature Conservancy. Rocky Mountain Elk Foundation (RMEF) and TNC conservation easements and preserves were digitized by the TNC's Wyoming Field Office and the Midwest Conservation Science Center from 1:24,000 topographic quads.

Although site selection was made independent of ownership, at the onset of the ecoregional planning process it was expected that many of the conservation sites in the ecoregional portfolio would be located on publicly managed lands. There were two main reasons why this assumption was made. First, it is thought that some public lands would be of higher quality in terms of natural values because there is direction for conservation of biodiversity even in the multiple use environment. Second, the coarse-filter step in ecoregional planning depended heavily on the Black Hills Community Inventory, which concentrated on public lands because of private access issues. The resulting portfolio approached these expectations: 40% of the total area of all recommended portfolio sites is currently managed by the Forest Service, 7% is managed by the state, 4% is managed by the National Park Service, and 2% is managed by the Bureau of Land Management. Forty-five percent of the total portfolio is privately owned land, and almost 2% of that has been conserved by The Nature Conservancy, either through direct ownership or conservation easement.

There is significant public ownership of lands within the ecoregion and of selected portfolio sites, but there is great variation as to the degree to which public lands are managed for long-term biodiversity conservation. It was important to get a better sense of *how* land in the ecoregion is being managed. To do this, all managed areas were assigned to one of four categories based on management goals (Table 4). The managed areas were then mapped showing managed area classification (Figure 10). This simplified approach gives more discrimination in analyzing target occurrences and sites when compared to viewing the many scattered parcels of public land by ownership. All Level 1 (highly protected) managed areas are included in the portfolio of sites. A majority (58%) of Level 2 (moderately protected) managed areas are also included in the portfolio of sites.

Table 4. Managed areas classification (modified from Caicco *et al.* 1995). The classification categorizes sites by the degree of emphasis on management for natural values.

LEVEL 1 Highly Protected Managed Areas	An area "maintained in its natural state with an active management which allows for mimicking of natural processes or allows natural disturbance events to proceed without interference."	Examples: National Park units, Wilderness Areas, Research Natural Areas, The Nature Conservancy preserves
LEVEL 2 Moderately Protected Managed Areas	An area that is generally managed for its natural values but may receive use that degrades the quality of natural communities that are present.	Examples: Late Succession Landscapes, Botanical Areas
LEVEL 3 Managed Areas of Low Protection	An area that is generally managed for consumptive or recreational values, but which also may maintain some natural value.	Examples: All other National Forest lands, State Parks and other State lands, The Nature Conservancy easements
LEVEL 4 Areas with No Protection	All land in public or private ownership without an existing easement or management agreement that maintains native species and natural communities.	Example: Private

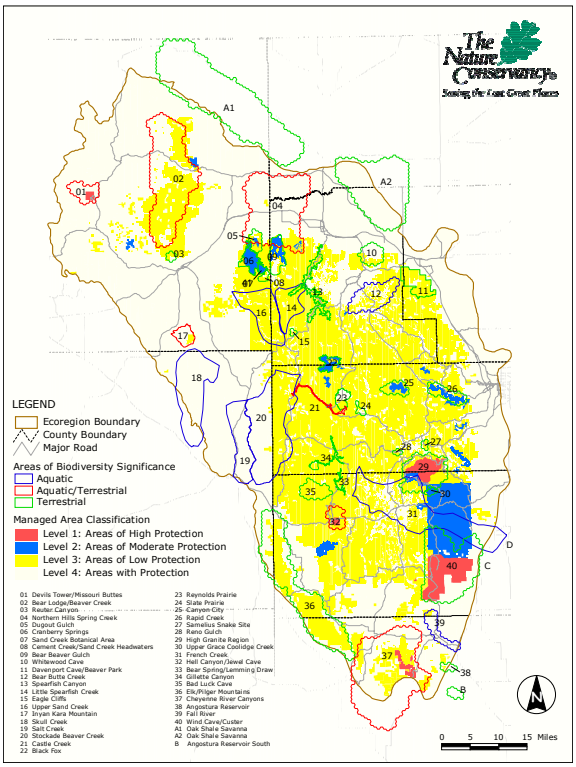

Figure 10. Managed area classification (modified from Caicco et al. 1995) of the portfolio of conservation sites.

Additional Conservation Sites

The Black Hills ecoregion, as mentioned in Section I, is completely surrounded by the Northern Great Plains Steppe ecoregion. Ecoregional planning for The Northern Great Plains Steppe was completed in 1999. There were several sites identified during that planning effort that are adjacent to the Black Hills – Little Missouri Woodlands and Cheyenne River Riparian. The Little Missouri Woodland site is at the northwestern boundary of the Black Hills ecoregion and was established for the conservation of a deciduous forest/woodland ecological complex of community targets. The Cheyenne River Riparian type was established for the conservation of a cottonwood riparian ecological complex of community targets. It is likely that the Cheyenne River Canyons site identified in the Black Hills planning effort overlaps a portion of the Cheyenne River Riparian site. Both planning teams should carefully examine these sites in future ecoregional planning iterations to see how they fit into each plan and to ensure that targets are adequately represented across their range.

In addition, there were three sites identified in the Black Hills planning process which primarily occur outside the Black Hills ecoregion. The Oak Shale Savanna (sites A1 and A2 in Figure 5) is drawn around several very unique, very rare, but under researched oak shale savanna community types that are often considered part of the Black Hills (see *Ecoregional Boundary* in Section II). The sites currently are within the Northern Great Plains Steppe ecoregion, but little was known about these rare community types when that planning effort took place. It is suspected that there are at least two or three types that occur here – Bur Oak/Sedge Woodland, Bur Oak/Needle-and-Thread

Grass and possibly Bur Oak/Western Wheatgrass. In order to ensure that these rare types are conserved, site boundaries were mapped during the Black Hills planning effort but not included in final analyses. Future iterations of Northern Great Plains Steppe planning should examine this area more closely.

Angostura Reservoir South (site B in Figure 5) was drawn around a single occurrence of *Amblycheila cylindriformis*. This tiger beetle is a regional endemic that occurs in scattered populations across its range, from western TX and eastern NM north to southwest SD. Unlike most tiger beetles, this species is flightless and nocturnal. In the Black Hills ecoregion, *Amblychelia cylindriformis* is restricted to a few sites in the southern foothills, always in undisturbed sandsage steppe habitat. This species is only known from 4 locations in the Black Hills – 2 at Angostura Reservoir and 2 at Cheyenne River Canyons. Two of the occurrences were captured in the Cheyenne River Canyons site (site 37). The planning team drew another small site around the more northern occurrence at Angostura Reservoir (site 38). A larger site at Angostura encompassing both occurrences of this tiger beetle was not created, for several reasons. Angostura Reservoir was created by the damming of the Cheyenne River, it is highly impacted by recreational uses, and it is not a high quality site for any other conservation targets. The target species is flightless, so doesn't need a large, connected site for movement, foraging or dispersal. Site B should be considered by the Northern Great Plains Steppe team in future planning iterations.

VI. Recommendations for Conservation Action

All sites occurring within the ecoregion portfolio warrant conservation action - they are all important to the long-term viability of biodiversity in the ecoregion. Given limited time and financial resources, however, it is not feasible that The Nature Conservancy and partners can work at all 40 Black Hills conservation sites over the short term. Sites should be prioritized for conservation actions based on the targets and the severity of the threats affecting that site.

Threats Assessment

Successful implementation of the ecoregional plan will hinge on the ability of the Conservancy and partners to develop strategies to abate existing and future threats to the biodiversity of the ecoregion. Depending on the circumstances, strategies for tackling these threats may be site-specific and implemented at individual sites, or may be more regional in scope and require implementation at broader levels. However, as a first step, it was critical that the threats be identified.

Stresses and Sources

To gain a better understanding of the threats influencing each site, the planning team assessed the stresses and the sources of each stress at each site. **Threat** is a term commonly used to refer to an unnatural pressure exerted onto an ecosystem that results in altered structure or function, and/or decreased biodiversity health and value. The Nature Conservancy, through the site conservation planning process (The Nature Conservancy 2000), has attempted to explore threats in more detail, by separating out the **stress** (impairment or degradation of the size, condition, and landscape context of conservation targets and the end result of reduced target viability) and the **source** of the stress (an extraneous factor, either human or biological that infringes upon a conservation target in a way that results in stress).

The two-step stress/source analysis helps conservation planners to identify more effective strategies for addressing critical threats. An example might help to illustrate the benefit of this way of thinking. Some might argue that grazing is a *threat* to grassland areas in the Black Hills. The two-step stress/source analysis would more appropriately argue that the *stress* to the ecosystem is altered structure and composition of the grassland ecosystem and that the *source* is incompatible grazing. This way of thinking helps conservation planners to understand the basic ecological, social, and political issues affecting the ecoregion, and to try to implement more appropriate and non-confrontational solutions, such as the initiation of compatible grazing practices, rather than simply arguing to stop the grazing completely.

The Black Hills planning team chose to use the site conservation planning stresses/sources analysis to identify threats in the ecoregion. By doing so, Conservancy site planners in the Black Hills would be in position to easily extend the conservation process beyond ecoregional planning. As site planning continues in the Black Hills, more information on the stresses and sources can be uncovered and used to better inform ecoregional priorities in the future. However, at the scale of ecoregional planning, it is often difficult to identify sources of each stress. Where possible, the planning team tried to assess this information to the best of their ability.

Multi-site Threats

As is true in most places in the United States, there are considerable stresses placed on conservation targets in the Black Hills ecoregion. A coarse assessment of threats completed by the planning team revealed that the major stresses in the Black Hills include: habitat disturbance, habitat fragmentation, habitat destruction or conversion, and alteration of natural fire regimes (Figure 11). Some of the sources behind these stresses are incompatible forestry, grazing and mining practices; incompatible home development; and fire suppression.

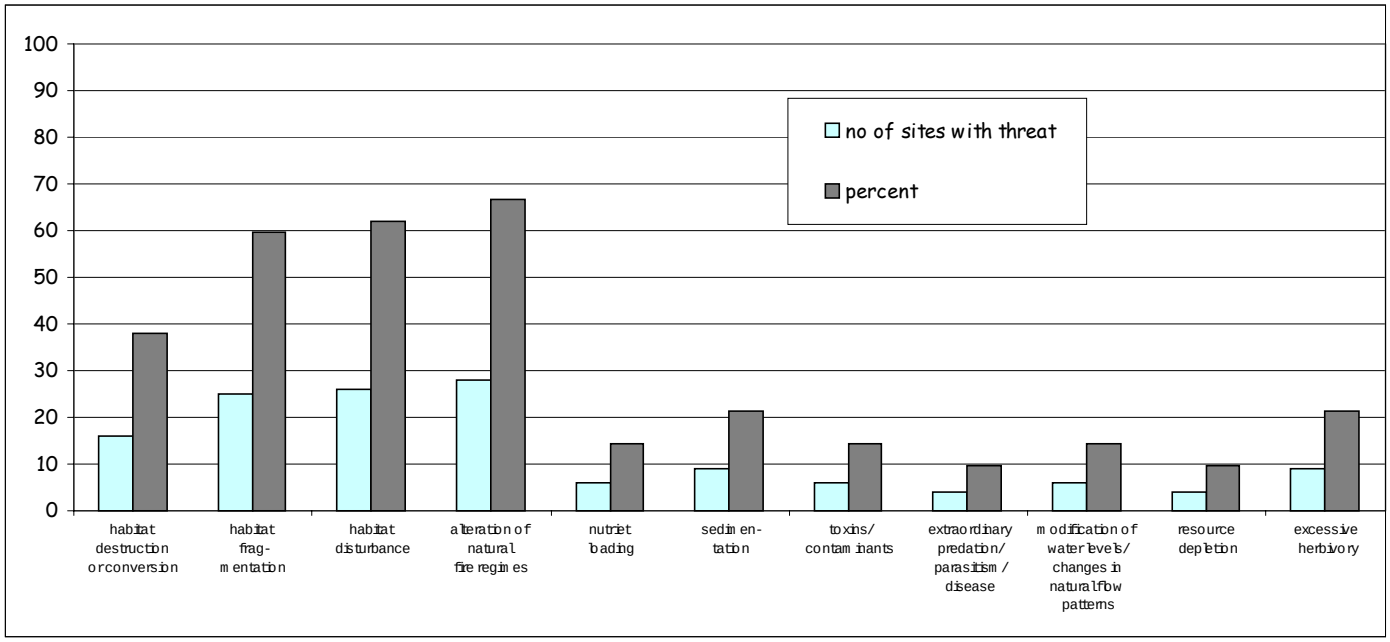

Figure 11. Stresses in the Black Hills ecoregion. Percent of all sites with each stress and number of sites with stress is illustrated. Major stresses include habitat destruction or conversion, habitat fragmentation, habitat disturbance, and alteration of natural fire regimes. Other stresses include nutrient loading, sedimentation, toxins or contaminants, predation/parasitism/disease, modification of water levels/changes in natural flow patterns, resource depletion and herbivory.

To better understand the threats, a few more specific statements can be made about the ecoregion:

- The potential for logging is present at any site with a good timber base.
- Most sites in the ecoregion are probably subject to some degree of livestock grazing.
- Large, low-elevation streams can be degraded by water impoundment, however, in contrast, most higher elevation streams in the ecoregion are degraded by decreased water impoundment from beaver.
- Any site encompassing a stream that drains a mined area might be subject to heavy-metals contamination.
- Native fish in streams with managed populations of introduced salmonids are almost certainly subject to increased predation by and competition with these exotics.
- Sites encompassing private inholdings may be subject to exurban development, especially if they are near established towns and major roads.

Threat Abatement

The strategies used to take conservation action at each action site will depend primarily on the targets and the severity of threats. The planning team did not make recommendations for conservation strategies during the planning process. It was felt that these recommendations should be discussed by The Nature Conservancy's Black Hills Program and partners in the ecoregion at a later time in the conservation process.

Future Research Questions

In addition to providing a plan for conservation action in the Black Hills, the ecoregional planning process also provides a detailed analysis of the research needs and questions in the ecoregion. The specifics of each research need or question is discussed throughout this document. Major research needs include:

- the effects of the Jasper Fire on ecoregional conservation targets and sites (see sections II and IV);
- a refinement of the terrestrial ecological systems classification and a method to more systematically identify occurrences (see section III);
- a better understanding of the composition and functionality of terrestrial and aquatic system types so that goals and viability can be better assessed (see sections III and IV);
- resources to identify new occurrences or relocate older occurrences of plant and animal targets (see section III);
- resources for inventory of the portfolio sites to identify more fully what targets they capture (see Appendix 6 – priority should be given to targets that do not meet conservation goals); and
- a better understanding of the size, condition and landscape context criteria for species targets (see section III).

Conclusion

The results of this planning effort represent a first iteration of ecoregional planning in the Black Hills based on the knowledge currently available regarding biodiversity in the Black Hills. The conservation targets and sites included here are well documented and clearly of conservation value and concern.

This ecoregional analysis will serve as a basis for conservation action by The Nature Conservancy and its partners in the Black Hills. In addition to a conservation action plan, this report serves as a

list of research needs in the ecoregion. It is intended that this first iteration of the Black Hills ecoregional planning will guide The Nature Conservancy, State and Federal agencies, and other partners in taking effective on-the-ground conservation action over the next three-to-five years. By planning at the site level and measuring success, it will then be possible to reassess and improve the plan for conservation in the Black Hills. Within ten years of the completion of this ecoregional analysis, a second iteration ecoregional planning process should begin to integrate new information in a comprehensive and well-documented manner.

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Appendix 1. Ecological System and Community Target Information for the Black Hills Ecoregion.

A total of 7 terrestrial ecological system targets and 68 different community association targets are defined for the Black Hills Ecoregion. Community targets are based on the classification established by the Black Hills Community Inventory (Marriott et al. 1999) and are consistent with the US National Vegetation Classification (Grossman et al. 1998).

Ecological systems are organized by pattern type, from matrix to linear. The community association types are listed by the ecological system that they occur in. Some types are listed twice because they occur in two different ecological systems. Some associations do not occur within the multi-associational systems - these types are listed in the last section headed "Single Association System Types".

Each community type has also assigned a Pattern and Distribution category. Matrix (M) pattern forest (F) and wetland (W) types form extensive cover, are the most widespread landform types, have broad ecological amplitude, and are driven by regional-scale processes; large patch (LP) communities may form extensive cover over some of the area, but usually their boundaries correlate with a single dominant process such as hydrology or soils; and small patch (SP) communities rarely form extensive cover, they have very specific ecological amplitudes and occur where a number of local conditions come together in a very precise way. Communities with Endemic/Restricted (E) distribution occur primarily or entirely within the Black Hills area; limited (L) community types occur within the area, but also within a few adjacent areas; and peripheral (P) communities occur rarely in the Black Hills area, with the core of their distribution in a different area.

Some community types are questionable in the classification and are marked with a "?" after their common name. It is not yet determined if they are valid types in the Black Hills because they are poorly defined or because only marginal examples of them can be found.

Ponderosa Pine Forest System

Ponderosa Pine Forest covers much of the Black Hills at higher elevations, typically above 5500 feet in the southern part, and above 4500 feet in the northern part. This matrix system is found in large-scale mosaics with several white spruce types, and high elevation shrubland, meadow and grassland types. Occurrences of the Ponderosa Pine Forest ecological system are composed of stands of ponderosa pine communities, including Ponderosa Pine / Bearberry Woodland, Ponderosa Pine / Chokecherry Forest, Ponderosa Pine / Mountain Ninebark Forest, Ponderosa Pine / Snowberry Forest and Ponderosa Pine / Common Juniper Woodland. Not all communities may be present, and some appear to be limited in distribution (for example, Ponderosa Pine / Mountain Ninebark Forest appears to be restricted to higher elevations in the southern Black Hills). Component communities can occur at lower elevations but are less common and not as extensive.

Minimum dynamic size and conservation scale for the Ponderosa Pine Forest system are largely speculative at this time. Marriott et al. (1999) proposed an A-ranked size specification of greater than 2500 acres for both Dry and Mesic Coniferous Forests and Woodlands (ecological groups). Ponderosa Pine Forest occurrences in this size range are common, although most are dissected to some degree by roads.

Assessing condition is difficult for ponderosa pine forest and woodland occurrences in the Black Hills. All stands have been altered to some degree. The area has been intensively managed for timber for more than 100 years. Fire suppression has had a significant impact for at least 50 years. Road density is high. It is not clear that some communities and systems as currently defined represent natural conditions. Condition rank specifications currently in use for ponderosa pine communities are based on lack of development (roads, towns, campgrounds), presence of what appear to be late successional stages, and degree to which natural or simulated natural processes, especially fire, have played a role in the recent past.

Community Association Types:	Pattern	Distribution	Element Code / Global Rank
Ponderosa Pine / Bearberry Woodland	MX-F	W	CEGL000844
Pinus ponderosa / Arctostaphylos uva-ursi Woodland			G4
Conservation Goal: 4 occurrences			
Distribution in Ecoregion: Northern Central Core, Southern Central Core, Northern Limestone Plateau, Southern Limestone Plateau, Eastern Foothills, possibly Bear Lodge			
Ponderosa Pine/Common Juniper Woodland	MX-F	L	CEGL000859
Pinus ponderosa / Juniperus communis Woodland			G4?
Conservation Goal: 4 occurrences			
Distribution in Ecoregion: All planning units (possibly in the Eastern Foothills)			
Ponderosa Pine / Rough-leaf Ricegrass Woodland (?)	MX-F	E	CEGL002123
Pinus ponderosa / Oryzopsis asperifolia Woodland			G3G4Q
Conservation Goal: 9 occurrences			
Distribution in Ecoregion: Northern Central Core, Southern Central Core, Northern Limestone Plateau, Bear Lodge, possible in Southern Limestone Plateau			
Ponderosa Pine / Mountain Ninebark Forest	MX?-F	L	CEGL000190
Pinus ponderosa / Physocarpus monogynus Forest			G3
Conservation Goal: 4 occurrences			
Distribution in Ecoregion: South Central Core, Southern Limestone Plateau, Southwestern Foothills			
Ponderosa Pine / Chokecherry Forest	LP	L	CEGL000192
Pinus ponderosa / Prunus virginiana Forest			G4
Conservation Goal: 4 occurrences			
Distribution in Ecoregion: Northern Limestone Plateau, Southern Limestone Plateau, Northwestern Foothills, Southwestern Foothills, Eastern Foothills, possibly North Central Core and Bear Lodge			
Ponderosa Pine / Snowberry Forest	MX-F	W?	CEGL000203
Pinus ponderosa / Symphoricarpos albus Forest			G4?
Conservation Goal: 3 occurrences			
Distribution in Ecoregion: North Central Core, Northern Limestone Plateau, possibly South Central Core and Southern Limestone Plateau			

Ponderosa Pine Woodland System

Ponderosa Pine Woodland is best developed at lower elevations in the Black Hills, below 5500 feet in the southern part, and 4500 feet in the northern part. Stands are occasional at higher elevations. This matrix system typically occurs in large-scale mosaics with grassland and shrubland types, and with bur oak in the northern and eastern Black Hills. Some communities of the Ponderosa Pine Forest ecological system may be present on more mesic sites. Occurrences of the Ponderosa Pine Woodland ecological system are composed of stands of ponderosa pine communities, including Ponderosa Pine / Bluebunch Wheatgrass Woodland, Ponderosa Pine / Chokecherry Forest, Ponderosa Pine / Little Bluestem Woodland, Ponderosa Pine / Rocky Mountain Juniper Woodland, Ponderosa Pine / Sedge Woodland and Ponderosa Pine / Western Wheatgrass Woodland. Not all communities may be present, and some appear to be limited in distribution (for example, Ponderosa Pine / Bluebunch Wheatgrass Woodland appears to be restricted to lower elevations in the northwestern Black Hills). Component communities can occur at higher elevations but are less common and not as extensive.

Minimum dynamic size and conservation scale for the Ponderosa Pine Woodland system are largely speculative at this time. Marriott et al. (1999) proposed an A-ranked size specification of greater than 2500 acres for both Dry and Mesic Coniferous Forests and Woodlands (ecological groups). Ponderosa Pine Woodland occurrences in this size range are common, although most are dissected to some degree by roads (see below).

Assessing condition is difficult for ponderosa pine forest and woodland occurrences in the Black Hills. All stands have been altered to some degree. The area has been intensively managed for timber for more than 100 years. Fire suppression has had a significant impact for at least 50 years. Road density is high. It is not clear that some communities and systems as currently defined represent natural conditions. Condition rank specifications currently in use for ponderosa pine communities are based on lack of development (roads, towns, campgrounds), presence of what appear to be late successional stages, and degree to which natural or simulated natural processes, especially fire, have played a role in the recent past.

Community Association Types:	Pattern	Distribution	Element Code / Global Rank
Ponderosa Pine / Sedge Woodland	MX-F	L	CEGL000849
Pinus ponderosa / Carex inops ssp. heliophila Woodland			G3
Conservation Goal: 4 occurrences			
Distribution in Ecoregion: North Central Core, Southern Limestone Plateau, Northwestern Foothills, Southwestern Foothills, Eastern Foothills, possibly Southern Central Core and Bear Lodge			
Ponderosa Pine / Rocky Mountain Juniper Woodland	MX-F	L	CEGL000861
Pinus ponderosa / Juniperus scopulorum Woodland			G4
Conservation Goal: 4 occurrences			
Distribution in Ecoregion: Southern Limestone Plateau, Northwestern Foothills, Southwestern Foothills, possibly Eastern Foothills			
Ponderosa Pine / Western Wheatgrass Woodland	MX-F	L	CEGL000188
Pinus ponderosa / Pascopyrum smithii Woodland			G3G4
Conservation Goal: 4 occurrences			
Distribution in Ecoregion: Northwestern Foothills, Southwestern Foothills, Eastern Foothills			
Ponderosa Pine / Chokecherry Forest	LP	L	CEGL000192
Pinus ponderosa / Prunus virginiana Forest			G4
Conservation Goal: 4 occurrences			
Distribution in Ecoregion: Northern Limestone Plateau, Southern Limestone Plateau, Northwestern Foothills, Southwestern Foothills, Eastern Foothills, possibly North Central Core and Bear Lodge			
Ponderosa Pine / Bluebunch Wheatgrass Woodland	LP?	P	CEGL000865
Pinus ponderosa / Pseudoroegneria spicata Woodland			G4
Conservation Goal: 1 occurrences			
Distribution in Ecoregion: Northwestern Foothills			
Ponderosa Pine / Little Bluestem Woodland	MX-F	W?	CEGL000201
Pinus ponderosa / Schizachyrium scoparium Woodland			G3G4
Conservation Goal: 4 occurrences			
Distribution in Ecoregion: All planning units			

Upland Aspen System

The Upland Aspen Forest ecological system is best developed at higher elevations (greater than 4500 feet) in the northern Black Hills, including the Bear Lodge Mountains. Smaller aspen stands also occur in the southern Black Hills at higher elevations. This large patch system typically occurs in large-scale mosaics with communities of the Ponderosa Pine Forest ecological system, and with white spruce communities. Paper Birch / Hazel Forest is often present on slightly more mesic sites. The Upland Aspen Forest ecological system usually is composed of stands of three communities: Aspen / Beaked Hazel Forest, Aspen / Bracken Fern Forest and Aspen / Shiny-leaf Forest. The last is a variable type, including a variety of understory herbaceous dominants.

Minimum dynamic size and conservation scale for the Upland Aspen Forest system are largely speculative at this time. Marriott et al. (1999) proposed an A-ranked size specification of greater than 500 acres for Upland Hardwood Forests and Woodlands, an ecological group. Upland Aspen Forest occurrences of this size do occur in the northern Black Hills.

Large aspen stands in the northern Black Hills probably approach natural condition. Maintenance of aspen to provide wildlife habitat has been a goal on public lands in this area. Presence of roads and non-native understory species are the two most common factors for downranking condition.

Community Association Types:	Pattern	Distribution	Element Code / Global Rank
Aspen / Beaked Hazel Forest	LP	L	CEGL000583
Populus tremuloides / Corylus cornuta Forest			G3
Conservation Goal: 4 occurrences Distribution in Ecoregion: Southern Central Core, Northern Limestone Plateau, Bear Lodge, possibly Northern Central Core			
Aspen / Bracken Fern Forest	LP	L	CEGL000597
Populus tremuloides / Pteridium aquilinum Forest			G4
Conservation Goal: 4 occurrences Distribution in Ecoregion: Northern Limestone Plateau, Bear Lodge Mountains, possibly Northern Central Core			
Aspen / Shiny-leaf Spiraea Forest	LP	L	CEGL000607
Populus tremuloides / Spiraea betulifolia Forest			G4Q
Conservation Goal: 4 occurrences Distribution in Ecoregion: Northern Limestone Plateau, Bear Lodge, possibly Northern Central Core, Southern Central Core and Southern Limestone Plateau			

Prairie System

The Prairie ecological system occurs at lower elevations in the Black Hills, generally below 5500 feet in the southern part, and below 4500 feet in the northern part. Smaller stands of component communities occur at elevations as high as 6000 feet in the southern Black Hills. This large patch system typically occurs in large scale mosaics with Ponderosa Pine Woodland communities and with low-elevation shrubland types. The Prairie ecological system includes stands of grassland communities, including Western Wheatgrass - Green Needlegrass Mixedgrass Prairie, Needle-and-Thread - Blue Grama Mixedgrass Prairie, Northern Great Plains Little Bluestem Prairie, Northern Plains Big Bluestem Prairie, Western Wheatgrass - Blue Grama - Threadleaf Sedge Prairie and Wheatgrass - Needle-and-Thread Mixedgrass Prairie. Not all communities may be present. The Western Wheatgrass - Green Needlegrass and Big Bluestem Prairie types are better developed in more mesic habitats.

Minimum dynamic size and conservation scale for the Prairie system are largely speculative at this time. Marriott et al. (1999) proposed an A-ranked size specification of greater than 500 acres for Dry Mixedgrass and Mesic Tallgrass Prairies (ecological groups), and greater than 2500 acres for Mesic Mixedgrass Prairie, also an ecological group. Stands in these size ranges are common at lower elevations in the Black Hills, although the larger ones are often dissected to some degree by roads.

Large prairie stands in the Black Hills appear to approach natural condition, based on species composition. Some have been overgrazed, but this is not the prevailing condition. Fire suppression has led to forest encroachment in some areas, while prescribed fire has been used to maintain prairies in others. Presence of roads and non-native species are the two most common factors for downranking condition.

Community Association Types:	**Pattern**	**Distribution**	**Element Code / Global Rank**
Northern Plains Big Bluestem Prairie	LP	P?	CEGL002205
Andropogon gerardii - Schizachyrium scoparium Northern Plains Herbaceous Vegetation			G3G5
Conservation Goal: 2 occurrences Distribution in Ecoregion: Eastern Foothills, possible in Northwestern Foothills, Southwestern Foothills. Goal may be too low.			
Western Wheatgrass - Blue Grama - Threadleaf Sedge Prairie	LP	W	CEGL001579
Pascopyrum smithii - Bouteloua gracilis - Carex filifolia Herbaceous Vegetation			G4
Conservation Goal: 3 or 4 occurrences Distribution in Ecoregion: Northwestern Foothills, possibly Southern Foothills and Eastern Foothills			
Western Wheatgrass - Green Needlegrass Mixedgrass Prairie	MX-G	W	CEGL001583
Pascopyrum smithii - Nassella viridula Herbaceous Vegetation			G3G4
Conservation Goal: 4 occurrences Distribution in Ecoregion: Southern Central Core, Southern Limestone Plateau, Eastern Foothills, possibly Bear Lodge, Northwestern Foothills, Southwestern Foothills			
Wheatgrass - Needle-and-Thread Mixedgrass Prairie	MX-G	W	CEGL002034
Pascopyrum smithii - Stipa comata Central Mixedgrass Herbaceous Vegetation			G4
Conservation Goal: 4 occurrences Distribution in Ecoregion: Southern Limestone Plateau, Northwestern Foothills, Eastern Foothills, possible in the Bear Lodge and Southwestern Foothills			
Northern Great Plains Little Bluestem Prairie	MX-G	W	CEGL001681
Schizachyrium scoparium - Bouteloua (curtipendula, gracilis) / Carex filifolia Herbaceous Vegetation			G3G4
Conservation Goal: 4 occurrences Distribution in Ecoregion: Bear Lodge, Northwestern Foothills, Southwesten Foothills, Eastern Foothills, peripheral to Southern Limestone Plateau			
Needle-and-Thread - Blue Grama Mixedgrass Prairie	LP	W	CEGL002037
Stipa comata - Bouteloua gracilis - Carex filifolia Herbaceous Vegetation			G5
Conservation Goal: 3 or 4 occurrences Distribution in Ecoregion: Extent unkown - but found in the Northwestern Foothills, Southwestern Foothills, Eastern Foothills			

High Elevation Wetland System

The High Elevation Wetland ecological system occurs at elevations above 5500 feet in the southern Black Hills, and above 4500 feet in the northern part. This small patch system is often found adjacent to Black Hills Montane Grassland, white spruce stands, and communities of the Ponderosa Pine Forest ecological system. The High Elevation Wetland ecological system can include occurrences of Beaked Willow Scrub, Black Hills Streamside Vegetation, Canadian Reedgrass Wet Meadow, Nebraska Sedge Wet Meadow and Prairie Cordgrass - Sedge Wet Meadow. The last two also occur at lower elevations. Not all communities may be present.

Minimum dynamic size and conservation scale for the Prairie system are largely speculative at this time. Marriott et al. (1999) proposed an A-ranked size specification of greater than 25 acres for Riparian/Wet Meadows, an ecological group. Stands in this size range are present but uncommon at higher elevations in the Black Hills.

High elevation wetlands in the Black Hills are variable in terms of condition. Some have been overgrazed, have infestations of non-native species, and/or have been drained or altered to some degree. Others include a diverse mix of native graminoids and shrubs, and are lightly utilized. Altered hydrology, heavy utilization and non-native species are the most common factors for downranking condition.

Community Association Types:	Pattern	Distribution	Element Code / Global Rank
Canadian Reedgrass Wet Meadow	SP	W	CEGL001559
Calamagrostis canadensis Western Herbaceous Vegetation			G4Q
Conservation Goal: 8 occurrences			
Distribution in Ecoregion: Northern Central Core, Southern Central Core, possibly Northern Limestone Plateau			
Nebraska Sedge Wet Meadow	SP	W	CEGL001813
Carex nebrascensis Herbaceous Vegetation			G4
Conservation Goal: 8 occurrences			
Distribution in Ecoregion: all planning units, except possible in the Southern Foothills			
Black Hills Streamside Vegetation	LI	E?	CEGL005262
Glyceria grandis - Poa palustris - Mixed Herbaceous Black Hills Herbaceous Vegetation [Provisional]			G2G4
Conservation Goal: 14? occurrences			
Distribution in Ecoregion: Northern Central Core, Southern Central Core, Northern Limestone Plateau, possible in Southern Limestone Plateau, Bear Lodge			
Beaked Willow Scrub	LI	W?	CEGL001173
Salix bebbiana Shrubland			G3?
Conservation Goal: 8 occurrences			
Distribution in Ecoregion: Northern and Southern Core, Northern Limestone Plateau, possibly Southern Limestone Plateau, Bear Lodge, peripheral to Eastern Foothills			
Prairie Cordgrass - Sedge Wet Meadow	SP	P	CEGL001477
Spartina pectinata - Carex spp. Herbaceous Vegetation			G3?
Conservation Goal: 4 or 8 occurrences			
Distribution in Ecoregion: Southern Central Core, Northwestern Foothills, Eastern Foothills, possibly Northern Central Core, Bear Lodge and Southerwestern Foothills			

Low Elevation Floodplain System

The Low Elevation Floodplain ecological system occurs along larger streams and rivers below 5000 feet in the Black Hills. Most habitat is in private ownership; as a result, this system is undersurveyed and not well-characterized. This linear system is composed of various combinations of low elevation hardwood and shrubland types, including Ash - Elm / Wolfberry Forest, Box Elder / Chokecherry Forest, Cottonwood - Peach-leaf Willow Floodplain Woodland, Cottonwood / Wolfberry Floodplain Woodland, Sandbar Willow Shrubland, Silver Sagebrush / Western Wheatgrass Shrub Prairie and Western Snowberry Shrubland. Grassland stands may be present also.

Minimum dynamic size and conservation scale for the Prairie system are largely speculative at this time. Marriott et al. (1999) proposed an A-ranked size specification of greater than 5 miles for Plains Riparian Forests and Shrublands, an ecological group. Stands in this size range do occur along the larger streams, such as the Belle Fourche and Cheyenne Rivers, but are often in poor condition.

The Low Elevation Floodplain ecological system has not been well-characterized in the Black Hills, but available information strongly suggests that condition is often poor. Altered hydrology, heavy utilization and non-native species have had significant impact.

Community Association Types:	Pattern	Distribution	Element Code / Global Rank
Box Elder / Chokecherry Forest	LI	W?	CEGL000628
Acer negundo / Prunus virginiana Forest			G3
Conservation Goal: 6 occurrences			
Distribution in Ecoregion: Eastern Foothills, possibly Northwestern Foothills, Southwestern Foothills, peripheral Southern Limestone Plateau			
Silver Sagebrush / Western Wheatgrass Shrub Prairie	SP	L?	CEGL001072
Artemisia cana / Pascopyrum smithii Shrubland			G4
Conservation Goal: 8?? occurrences			
Distribution in Ecoregion: Northwestern Foothills, Southwestern Foothills, possibly Eastern Foothills			
Ash - Elm / Wolfberry Forest	LI	W	CEGL002082
Fraxinus pennsylvanica - Ulmus americana / Symphoricarpos occidentalis Forest			G3G5
Conservation Goal: 4 o r 8 occurrences			
Distribution in Ecoregion: Northwestern Foothills, Eastern Foothills, possible in the Southwestern Foothills			
Cottonwood - Peach-Leaf Willow Floodplain Woodland	LI	W	CEGL000659
Populus deltoides - (Salix amygdaloides) / Salix exigua Woodland			G3G4
Conservation Goal: 4 o r 8 occurrences			
Distribution in Ecoregion: Northwestern Foothills, Eastern Foothills, possibly Southwestern Foothills			
Cottonwood / Wolfberry Floodplain Woodland	LI	L?	CEGL000660
Populus deltoides / Symphoricarpos occidentalis Woodland			G2G3
Conservation Goal: 4 or 8 occurrences			
Distribution in Ecoregion: Northwestern Foothills, Eastern Foothills, possibly Southwestern Foothills			
Sandbar Willow Shrubland	LI	W?	CEGL001197
Salix exigua Temporarily Flooded Shrubland			G5
Conservation Goal: 8 occurrences			
Distribution in Ecoregion: Northern Central Core, Southern Central Core, Southwestern Foothills, Eastern Foothills, possibly in the Bear Lodge, Northern Limestone Plateau and Northwestern Foothills			
Western Snowberry Shrubland	SP	W	CEGL001131
Symphoricarpos occidentalis Shrubland [Provisional]			G4G5
Conservation Goal: 4 occurrences			
Distribution in Ecoregion: Northeern Central Core, Southern Limestone Plateau, Northwestern Foothills, Eastern Foothills, possibly in the other planning units			

High Elevation Riparian System

The High Elevation Riparian Vegetation ecological system occurs along streams at elevations above 5500 feet in the southern Black Hills, and above 4500 feet in the northern part. This linear system is often found adjacent to Black Hills Montane Grassland, white spruce stands, and communities of the Ponderosa Pine Forest ecological system. Occurrences of this ecological system are composed of various combinations of riparian forest, shrubland and herbaceous types, including Beaked Willow Scrub, Black Hills Streamside Vegetation, Sandbar Willow Shrubland, Water Birch / Red-osier Dogwood Shrubland and White Spruce Alluvial Black Hills Forest. This system is similar to the High Elevation Wetland system, but occurs in linear stands, and does not include extensive wet meadow types.

Minimum dynamic size and conservation scale for the Prairie system are largely speculative at this time. Marriott et al. (1999) proposed an A-ranked size specification of greater than 5 miles for High Elevation Riparian Forests and Shrublands, an ecological group. Riparian stands in this size range do occur in the Black Hills, but unaltered stretches generally are significantly shorter.

Condition of high elevation riparian types in the Black Hills is variable. High-quality stands have been documented but only a few approach A-ranked size (greater than 5 miles). Altered hydrology, roads and non-native species are the most common factors behind downranking of condition.

Community Association Types:	Pattern	Distribution	Element Code / Global Rank
Water Birch / Red-osier Dogwood Shrubland	LI	W	CEGL001161
Betula occidentalis / Cornus sericea Shrubland			G3?
Conservation Goal: 8 occurrences			
Distribution in Ecoregion: Northern and Southern Central Core			
Black Hills Streamside Vegetation	LI	E?	CEGL005262
Glyceria grandis - Poa palustris - Mixed Herbaceous Black Hills Herbaceous Vegetation [Provisional]			G2G4
Conservation Goal: 14? occurrences			
Distribution in Ecoregion: Northern Central Core, Southern Central Core, Northern Limestone Plateau, possible in Southern Limestone Plateau, Bear Lodge			
White Spruce Alluvial Black Hills Forest	LI	E	CEGL002057
Picea glauca Alluvial Black Hills Forest			G2G3
Conservation Goal: 9 occurrences			
Distribution in Ecoregion: Northern and Southern Central Core, Northern Limestone Plateau, possible in the Southern Limestone Plateau			
Beaked Willow Scrub	LI	W?	CEGL001173
Salix bebbiana Shrubland			G3?
Conservation Goal: 8 occurrences			
Distribution in Ecoregion: Northern and Southern Core, Northern Limestone Plateau, possibly Southern Limestone Plateau, Bear Lodge, peripheral to Eastern Foothills			
Sandbar Willow Shrubland	LI	W?	CEGL001197
Salix exigua Temporarily Flooded Shrubland			G5
Conservation Goal: 8 occurrences			
Distribution in Ecoregion: Northern Central Core, Southern Central Core, Southwestern Foothills, Eastern Foothills, possibly in the Bear Lodge, Northern Limestone Plateau and Northwestern Foothills			

Single Association Systems

Some plant communities occur only linearly, or in small or larger patch areas, and are only appropriately addressed at the scale of the community occurrence. All of the following types were treated as single association occurrences.

Community Association Types:	Pattern	Distribution	Element Code / Global Rank
Big Sagebrush / Western Wheatgrass Shrub Grassland	LP	L?	CEGL001047
Artemisia tridentata ssp. wyomingensis / Pascopyrum smithii Shrub Herbaceous Vegetation			G4
Conservation Goal: 2 occurrences			
Distribution in Ecoregion: Northwestern Foothills, Southwestern Foothills, possibly Eastern Foothills			
Paper Birch / Hazel Forest	SP	W	CEGL002079
Betula papyrifera / Corylus cornuta Forest			G2G3
Conservation Goal: 8 occurrences			
Distribution in Ecoregion: Northern Central Core, Southern Central Core, Northern Limestone Plateau, Bear Lodge			
Black Hills Granite/Metamorphic Rock Outcrop	SP	E	CEGL002295
Black Hills Granite/Metamorphic Rock Outcrop Sparse Vegetation			G4
Conservation Goal: 4 , more? occurrences			
Distribution in Ecoregion: Northern Central Core, Southern Central Core, Bear Lodge, Northwestern Foothills			
Mountain Mahogany / Side-oats Grama Shrubland	LP	P?	CEGL001086
Cercocarpus montanus / Bouteloua curtipendula Shrubland			G5
Conservation Goal: 2 occurrences			
Distribution in Ecoregion: Southwestern Foothills, Eastern Foothills, peripheral Southern Limestone Plateau			
Black Hawthorne Shrubland	LI	L?	CEGL001093
Crataegus douglasii - (Crataegus chrysocarpa) Shrubland			G2Q
Conservation Goal: 6 occurrences			
Distribution in Ecoregion: Northern Limestone Plateau, Bear Lodge Northwestern Foothills			
Alkali Sacaton Saline Prairie	LI	P?	CEGL002274
Distichlis spicata - Hordeum jubatum - Sporobolus airoides Herbaceous Vegetation			G?
Conservation Goal: 4 or 8 occurrences			
Distribution in Ecoregion: Northwestern Foothills, possible in Southwestern Foothills and Eastern Foothills			
Creeping Spikerush Wet Meadow	SP	W	CEGL001833
Eleocharis palustris Herbaceous Vegetation			G5
Conservation Goal: 4 or 8 occurrences			
Distribution in Ecoregion: Eastern Foothills, possible in the Northwestern Foothills and Southwestern Foothills			
Baltic Rush Wet Meadow (?)	SP	P?	CEGL001838
Juncus balticus Herbaceous Vegetation			G5
Conservation Goal: 4 occurrences			
Distribution in Ecoregion: Northern Central Core			
Creeping Juniper / Little Bluestem Dwarf-shrubland	SP	P	CEGL001394
Juniperus horizontalis / Schizachyrium scoparium Dwarf-shrubland			G4
Conservation Goal: 2 occurrences			
Distribution in Ecoregion: Eastern Foothills, possibly Southwestern Foothills			
Rocky Mountain Juniper / Little-seed Ricegrass Woodland	LP	P	CEGL000747
Juniperus scopulorum / Oryzopsis micrantha Woodland			G3
Conservation Goal: 1 occurrences			
Distribution in Ecoregion: Southwestern Foothills, possibly Northwesten Foothills and Eastern Foothills			
White Spruce/Twinflower Forest	LP	E	CEGL000382
Picea glauca / Linnaea borealis Forest			G2G3
Conservation Goal: 9 occurrences			
Distribution in Ecoregion: Northern Central Core, Southern Central Core, Northern Limestone Plateau, Southern Limestone Plateau			

White Spruce/Grouseberry Forest SP E CEGL000383
Picea glauca / Vaccinium scoparium Forest G1G2
Conservation Goal: 14 occurrences
Distribution in Ecoregion: Northern Limestone Plateau, possibly Southern Limestone Plateau

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Ponderosa Pine / Oregon Grape Forest LP L CEGL000187
Pinus ponderosa / Mahonia repens Forest G3
Conservation Goal: 4 occurrences
Distribution in Ecoregion: Northwestern Foothills, possibly Northern Limestone Plateau, Southern Limestone Plateau, and the Bear Lodge Mountains

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Ponderosa Pine / Bur Oak Woodland (?) LP E CEGL000873
Pinus ponderosa / Quercus macrocarpa Woodland G3
Conservation Goal: 9 occurrences
Distribution in Ecoregion: Bear Lodge, Northwestern Foothills, Eastern Foothills, peripheral Northern Limestone Plateau

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Ponderosa Pine Limestone Cliff SP L CEGL002055
Pinus ponderosa Limestone Cliff Sparse Vegetation G4?
Conservation Goal: 2 or 4 occurrences
Distribution in Ecoregion: Northern and Southern Limestone Plateau, Soutwestern and Eastern Foothills

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Ponderosa Pine Scree Slope SP W? CEGL000878
Pinus ponderosa Scree Woodland G4
Conservation Goal: 4 occurrences
Distribution in Ecoregion: Northern Central Core, Eastern Foothills, possibly Southern Central Core and Northwestern Foothills

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Narrowleaf Cottonwood / Red-osier Dogwood Forest LI P CEGL002664
Populus angustifolia / Cornus sericea Woodland G4
Conservation Goal: 4 occurrences
Distribution in Ecoregion: Eastern Foothills, peripheral Northern Limestone Plateau

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Aspen/Chokecherry Forest (?) LI L CEGL000596
Populus tremuloides / Prunus virginiana Forest G3?Q
Conservation Goal: 8 occurrences
Distribution in Ecoregion: Southern Central Core, Southern Limestone Plateau, possibly Northern Central Core and Bear Lodge

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Prairie Dog Town Grassland Complex LP W CECX002003
Prairie Dog Town Grassland Complex G4
Conservation Goal: 4 occurrences
Distribution in Ecoregion: Northwestern Foothills, Southwestern Foothills, Eastern Foothills

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Chokecherry Shrubland SP P? CEGL001108
Prunus virginiana Shrubland G4Q
Conservation Goal: 4, more? occurrences
Distribution in Ecoregion: Northern Central Core, Southerwestern Foothills, Eastern Foothills, possibly in the Southern Central Core, Northern Limestone Plateau, Southern Limestone Plateau, Bear Lodge and Northwestern Foothills

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Bur Oak / Sedge Woodland LP? L CEGL000554
Quercus macrocarpa / Carex inops ssp. heliophila Woodland G1G2
Conservation Goal: 4, more? occurrences
Distribution in Ecoregion: Northwestern Foothills, possibly Eastern Foothills (target has high grank, possibly extinct)

Bur Oak-Ironwood Forest LI E CEGL000555
Quercus macrocarpa / Ostrya virginiana Forest G2G3
Conservation Goal: 9 occurrences
Distribution in Ecoregion: Bear Lodge and Eastern Foothills, possibly Northwestern Foothills, peripheral Northern Central Core, Southern Central Core

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Bur Oak / Chokecherry - Western Snowberry Woodland CEGL002138

Quercus macrocarpa / Prunus virginiana - Symphoricarpos occidentalis Woodland G?

Conservation Goal: 4 occurrences

Distribution in Ecoregion: Northwestern Foothills, Eastern Foothills, possibly Bear Lodge

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Redbeds (Siltstone) Rock Outcrop SP W? CEGL005261

Redbeds (Siltstone, Sandstone, Gypsum) Sparse Vegetation G?

Conservation Goal: 4 occurrences

Distribution in Ecoregion: Northwestern Foothills, Southwestern Foothills, Eastern Foothills

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Ill-scented Sumac / Bluebunch Wheatgrass Shrub Prairie SP P? CEGL001120

Rhus trilobata / Pseudoroegneria spicata Shrub Herbaceous Vegetation G4

Conservation Goal: 2 occurrences

Distribution in Ecoregion: Northwestern Foothills, Eastern Foothills, possilbly in the Southwestern Foothills

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Peach-leaf Willow Woodland (?) LI? P? CEGL000947

Salix amygdaloides Woodland G3

Conservation Goal: 4 occurrences

Distribution in Ecoregion: valid type for Hills? Peripheral to Northern Limestone Plateau

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Sage Willow Fen L CEGL001188

Salix candida / Carex rostrata Shrubland G3

Conservation Goal: 8 occurrences

Distribution in Ecoregion: North Central Core

Western Great Plains Streamside Vegetation LI W? CEGL005263

Scirpus spp. - Poa palustris - Mixed Herbaceous Great Plains Streamside Herbaceous Vegetation [Provisional] G2G4

Conservation Goal: 8? occurrences

Distribution in Ecoregion: Eastern Foothills, possibly Northwestern Foothills, Southwestern Foothills

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Black Hills Talus SP E CEGL002307

Scree/Talus Black Hills Sparse Vegetation G2G4

Conservation Goal: 5 occurrences

Distribution in Ecoregion: Northern Central Core, Southern Central Core, Bear Lodge, Northwestern Foothills, Southwestern Foothills, possibly Eastern Foothills

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Shale Barren Slopes SP W? CEGL002294

Shale Barren Slopes Sparse Vegetation G?

Conservation Goal: 4 occurrences

Distribution in Ecoregion: Northwestern Foothills, Southwestern Foothills, Eastern Foothills

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Black Hills Montane Grassland LP E CEGL002240

Sporobolus heterolepis - Stipa richardsonii - Danthonia intermedia Herbaceous Vegetation G1G2

Conservation Goal: 9 or 12? occurrences

Distribution in Ecoregion: Northern Limestone Plateau, Southern Limestone Plateau, Bear Lodge, peripheral in Northern Central Core and Southern Cetnral Core. very threatened

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Great Plains Cattail - Bulrush Marsh P CEGL002228

Typha spp. - Scirpus spp. - Mixed Herbs Great Plains Herbaceous Vegetation G4G5

Conservation Goal: 4 occurrences

Distribution in Ecoregion: Eastern Foothills, possible in Northwestern Foothills, Southwestern Foothills

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Northern Great Plains Cattail Marsh SP W CEGL002389

Typha spp. Great Plains Herbaceous Vegetation G4G5

Conservation Goal: 8 occurrences

Distribution in Ecoregion: Northern Central Core, Southern Central Core, Northern Limestone Plateau, Bear Lodge, Northwestern Foothills, Southwestern Foothills, Eastern Foothills, possibly Southern Limestone Plateau

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Appendix 2. Plant Target Information for the Black Hills Ecoregion.

This report was compiled by Walt Fertig (Wyoming Natural Diversity Database), Jennifer Hall (The Nature Conservancy) and Dave Ode (South Dakota Natural Heritage Data Base) and lists detailed justification for the selection of each target plant species.

Target vascular plant species for the ecoregion were chosen based on their limited or isolated geographic ranges, high habitat specificity, or strong evidence of decline in the Black Hills. An emphasis was placed on those species considered Sensitive by the US Forest Service. For each target species, information has been assembled on distribution, abundance, and protection status from natural heritage program databases, consultation with regional experts, recent rare plant surveys, and the literature (see references). These data were used to develop conservation goals for each target element that address the minimum number of populations needed to ensure long-term survival. Point location data were also used to identify important biological areas for consideration in development of a conservation portfolio for the Black Hills.

New species and distribution records continue to be found in the Black Hills flora. As our knowledge of the flora improves, new species targets may be identified and existing target elements may need to be reconsidered. Likewise, the current portfolio of sites may need to be periodically revisited to ensure that the best quality populations are being considered for special management.

Primary Plant Targets

Global Name	Common Name	Global Code	Global Rank
Adiantum capillus-veneris	Southern Maidenhair-fern	PPADI03010	G5
Botrychium campestre	Prairie Dunewort	PPOPH010W0	G3
Carex alopecoidea	Foxtail Sedge	PMCYP030K0	G5
Carex tribuloides	Blunt-broom Sedge	PMCYP03DW0	G5
Corallorrhiza odontorhiza	Autumn Coral-root	PMORC0M030	G5
Dryopteris carthusiana	Spinulose Shield Fern	PPDRY0A040	G5
Epipactis gigantea	Giant Helleborine	PMORC11010	G4
Equisetum scirpoides	Dwarf Scouring Rush	PPEQU01080	G5
Lycopodium complanatum	Trailing Clubmoss	PPLYC01090	G5
Platanthera orbiculata	Large Roundleaf Orchid	PMORC1Y0K0	G5?
Salix serissima	Autumn Willow	PDSAL022P0	G4
Viola selkirkii	Great-spurred Violet	PDVIO04200	G5?

Adiantum capillus-veneris **Southern maidenhair fern**
Heritage Rank: G5/S1 (SD)
Range Comments: Disjunct. Occurs from Virginia to Texas, southwest Colorado, and Utah, south to tropical America and the warmer parts of the eastern hemisphere, with a disjunct population in the South Dakota Black Hills (Fall River County).
Habitat: Occurs on wet, limestone ledges and crevices along streams and springs. Black Hills populations occur in *Tufa* deposits at waters edge with *Epipactis gigantea* in shaded, sparse riparian zones of russian olive, juniper and elm. Without the warm, limey waters of Cascade Creek, this plant could not tolerate the winters in South Dakota.
Sensitivity: Single site known since 1898. Two parcels of Cascade Creek site are designated US Forest Service recreation areas and are potentially vulnerable to recreational and related management impacts. State Highway 71 runs within feet of Cascade Creek and highway reconstruction has impacted the creek. This road increases vulnerability of the population to weed invasion, runoff, potential toxic spills, etc. The hydrology of

the area may be potentially threatened from domestic wells in surrounding housing developments, although the source of the creek water is apparently deep and less vulnerable than previously assumed.
Status in the Black Hills: USFS Region 2 Sensitive Species. Abundant on stream banks in J.H. Keith picnic ground. Widely scattered clumps along creek to Cascade Falls.
Conservation Goals in the Black Hills: Although the default goal for all plant targets is 5 occurrences, because there is only one known occurrence of this species, the goal is to protect the known occurrence and to support survey to identify additional occurrences. Additionally, increase protection for this single known site.
Black Hills Ecoregion Planning Units: Southwestern Foothills
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	A	1994	Cheyenne River Canyons	EO recommended for conservation attention

Botrychium campestre **Prairie dunewort**
Heritage Rank: G3/S1 (WY)
Range Comments: Peripheral. Widely scattered from central Alberta to southern Iowa, the Wyoming Black Hills (Crook County), and northeastern Colorado
Habitat: Through most of its range, Prairie moonwort is found in untilled grasslands on loess, sand, or limestone-derived soils. The Wyoming population is atypical because it was found in a sandy Ponderosa pine/aspen forest.
Sensitivity: This species may be extremely sensitive to ground disturbances or succession from open grasslands to pine forests.
Status in the Black Hills: USFS Region 2 Sensitive Species. Prairie dunewort is known from a single collection in the Black Hills, last observed by Robert Dorn in 1973 near the Bear Lodge Summit Campground in the Bear Lodge Mountains. Dorn reported that the population was "very rare". Attempts to relocate this population by Hollis Marriott and Walter Fertig in 1989, 1993, and 1999 have been unsuccessful. This species can be difficult to locate because its leaves remain above ground for only a short period in the late Spring. Additional surveys should be conducted at the appropriate season in suitable habitats before this plant is dismissed as extirpated in the Black Hills.
Conservation Goals in the Black Hills: Although the default goal for all plant targets is 5 occurrences, because there is only one known occurrence of this species, the goal is to protect the known occurrence and to support survey to identify additional occurrences. The single occurrence near the Summit campground should be resurveyed and, if extant, provided appropriate management attention.
Black Hills Ecoregion Planning Units: Bear Lodge Mountains.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-001	X?	1973	Bear Lodge/Beaver Creek	EO recommended for conservation attention; only known occurrence in entire ecoregion.

Carex alopecoidea **Foxtail sedge**
Heritage Rank: G5/S1 (WY)
Range Comments: Disjunct. Occurs from Quebec to North Dakota and south to New Jersey, Illinois, and Iowa, with disjunct populations also occur in the Wyoming Black Hills (Crook County).
Habitat: Foxtail sedge occurs along streams and wooded swamps dominated by willows, birch, or hazelnut.
Sensitivity: Most populations appear to be very small, making them vulnerable to impacts from recreational activities, grazing, mining, and habitat loss.
Status in the Black Hills: USFS Region 2 Sensitive Species. Foxtail sedge is known from 3-5 populations in Wyoming in the Sand Creek and Dugout Gulch drainages and on Slaybaugh Creek in the Bear Lodge Mountains. Individual populations typically number in the low hundreds and are restricted to 3-5 acres of

suitable habitat. Two occurrences are located within the Dugout Gulch and Upper Sand Creek Special Botanical areas (the identity of the Dugout Gulch population needs to be confirmed).
Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. Three populations in the Slaybaugh Creek, Dugout Gulch, and Upper Sand Creek areas should be afforded management attention. Surveys, monitoring, and studies on the effects of grazing are needed at these sites. This species can be difficult to distinguish from *Carex vulpinoidea* and *C. gravida*, and additional populations may be discovered with additional survey work.
Black Hills Ecoregion Planning Units: Bear Lodge Mountains, Northern Limestone Plateau, and Northwestern Foothills.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-001	C	1989	Cement Creek/Sand Creek Headwaters	This EO or #002 are recommended for conservation attention. EO #001 has a larger population, but is in less pristine condition.
WY-002	B	1990	Sand Creek Botanical Area	See above
WY-003	E	1983	Bear Lodge/Beaver Creek	EO recommended for conservation attention, but more population information needed.
WY-004	E	1999	Dugout Gulch	EO recommended for conservation attention, but more population information needed and identity needs confirmation
WY-005	E	1984	Cement Creek/Sand Creek Headwaters	

***Carex tribuloides* Blunt-broom sedge**
Heritage Rank: G5/SU (SD)
Range Comments: Disjunct/Peripheral. Occurs from the Eastern US and Canada west to the eastern Great Plains. Disjunct in the South Dakota Black Hills (Custer County) from Cherry County, Nebraska.
Habitat: Wet woods, around ponds and lakes, swamps, wet prairies, along streams, wet meadows. Occasional in saturated soil of sedge meadow in open springhead meadow.
Sensitivity: Undetermined
Status in the Black Hills: Within the Black Hills this species is only recently discovered and currently known from only a single site in Custer County. Taxonomically confused with other members of the *Ovales* group. Grazed by cattle, sheep, and big game.
Conservation Goals in the Black Hills: Although the default goal for all plant targets is 5 occurrences, because there is only one known occurrence of this species, the goal is to protect the known occurrence and to support survey to identify additional occurrences. A floristic survey of the Black Elk Wilderness is in progress and may help determine status.
Black Hills Ecoregion Planning Units: Southern Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	E	1992	French Creek	Only known occurrence in ecoregion.

***Corallorrhiza odontorhiza* Autumn coral-root**
Heritage Rank: G5/SU (SD)
Range Comments: Disjunct. Known from Nebraska to New Hampshire, south to Florida, and east to Texas. In South Dakota, this species has only been collected once and possibly observed at a second site, both in Lawrence County.
Habitat: Occurs on dry to moist slopes in oak or pine woods.

Sensitivity: May be vulnerable
Status in the Black Hills: USFS Region 2 Sensitive Species. No recently verified populations are known.
Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. Inventory is needed for this species.
Black Hills Ecoregion Planning Units: Northern Central Core, Eastern Foothills
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	H	1971		
SD-003	E?	1994		Unverified

*002 misidentified as *C. trifida*

Dryopteris carthusiana **Spinulose shield fern**
Heritage Rank: G5/SU (SD)
Range Comments: Uncommon throughout range. Labrador to Alberta, south to Virginia, Missouri, Nebraska, and Idaho. Known from only one location in the South Dakota Black Hills (Custer County).
Habitat: Wet alluvial woods or swamps. Rare in moist soils of granite fissures and ravines along cool, shady drainage with spruce and pine in the Black Hills.
Sensitivity: Unknown, potentially impacted by recreational rock climbing.
Status in the Black Hills: Known from only one location in the Black Hills in Norbeck Wildlife Preserve, Custer County.
Conservation Goals in the Black Hills: Although the default goal for all plant targets is 5 occurrences, because there is only one known occurrence of this species, the goal is to protect the known occurrence and to support survey to identify additional occurrences. A floristic survey of Black Elk wilderness is in progress and may provide some information on this species.
Black Hills Ecoregion Planning Units: Southern Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	E	1993	High Granite Region	Only known occurrence in ecoregion.

Epipactis gigantea **Stream orchid/Giant helleborine**
Heritage Rank: G4/S1
Range Comments: Disjunct. Known from southern British Columbia south in the Rocky Mountains to central Mexico and Baja California. Disjunct in the South Dakota Black Hills from western Colorado and northwest Wyoming. It is the most commonly encountered orchid of the Pacific Coast, but rare in BC, WA, ID, CO, WY, MT. Restricted in the Black Hills to Cascade Creek.
Habitat: On steep, mostly shaded stream banks of Cascade Springs and Creek. Depends on the warm springs of Cascade Creek for survival. In other parts of range, found in stream margins, gravel bars, seepage areas and springs, often in calcareous soil.
Sensitivity: Single site. (see comments under *Adiantum capillus-veneris*)
Status in the Black Hills: USFS Region 2 Sensitive. Locallized along Cascade Creek south of Hot Springs. Between 150 and 250 plants observed growing on moist banks and islands with *Adiantum capillus-veneris*. Fewer than 50 plants observed on private land below picnic area.
Conservation Goals in the Black Hills: Although the default goal for all plant targets is 5 occurrences, because there is only one known occurrence of this species, the goal is to protect the known occurrence and to support survey to identify additional occurrences.
Black Hills Ecoregion Planning Units: Southwestern Foothills
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	B	1994	Cheyenne River Canyons	Only known occurrence in ecoregion

Equisetum scirpoides **Dwarf scouring-rush**
Heritage Rank: G5/S1(WY)/S2(SD)
Range Comments: Disjunct . Circumboreal, south in North America to New York, Michigan, Minnesota, South Dakota and Washington. Rare in the Black Hills – restricted to Lawrence and Pennington Counties in South Dakota and Crook County in Wyoming.
Habitat: Occurs on moist, shady, north-facing, mossy slopes associated with seeps or streams within *Picea glauca/Betula papyrifera* or *Betula papyrifera/Corylus cornuta/Populus tremuloides* forests. Most colonies are in forested riparian zones. One site is reported as dry gulch that may be an old mining pit.
Sensitivity: Populations may be vulnerable to habitat loss or alteration resulting from logging or recreation activities.
Status in the Black Hills: USFS Region 2 Sensitive Species. Dwarf scouring-rush is known from 15 populations in the Black Hills, only 9 of which have been discovered or relocated since 1989. Individual colonies are typically reported as locally abundant, although usually restricted to areas of less than 50 square meters. One population is found within the Upper Sand Creek Special Botanical Area, but the others are found in areas slated for timber harvest.
Conservation Goals in the Black Hills: Five "A" or "B" quality occurrences distributed throughout its range in the Black Hills (with at least 1-2 in Wyoming and the remainder in South Dakota) should be identified as conservation targets.
Black Hills Ecoregion Planning Units: Bear Lodge Mountains, Northwestern Foothills, Northern Limestone Plateau, Southern Central Core, Northern Central Core, Eastern Foothills.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-001	B	1997	Sand Creek Botanical Area	EO recommended for conservation attention
WY-002	B	1996	Bear Lodge/Beaver Creek?	EO recommended for conservation attention
WY-003	B	1997		
SD-001	H	1953		
SD-002	H	1971		
SD-003	H	1949		
SD-004	H	1941		
SD-005	H	1969	Castle Creek Valley	
SD-006	H	1927		
SD-007	A	1989	Bear Beaver Gulch	EO recommended for conservation attention
SD-008	B	1990	Higgins Gulch	
SD-009	E	1993		
SD-010	E	1993		Common in area.
SD-011	E	1994	Spearfish Creek	Widely dispersed through area.
SD-012	B	1994		

Lycopodium complanatum **Trailing clubmoss**
Synonym: *Diphasiastrum complanatum*
Heritage Rank: G5/S1(WY)/S1
Range Comments: Disjunct. Circumboreal, Newfoundland to Alaska, south to Washington, Montana, and Pennsylvania, with disjunct populations in the Black Hills (Crook County, WY and Lawrence County SD).
Habitat: The Wyoming population is found in small, semi-shady openings in gently sloping *Picea glauca/Betula papyrifera* forests. Terri Hildebrand also reports this species from a *Picea glauca/Corylus cornuta* association with an understory of *Vaccinium* in South Dakota (USDA Black Hills National Forest 1996).
Sensitivity: Small population size makes this species especially vulnerable to extirpation from over-collection for "Christmas greens" and from habitat disturbance associated with logging, mining, and road construction.

Status in the Black Hills: USFS Region 2 Sensitive Species. Known from only 4 populations in the Black Hills, all of which have been observed since 1988. The single Wyoming population covers an area of ca 30 x 50 meters and may represent a single genetic individual. This population is protected within the Upper Sand Creek Special Botanical Area.
Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. Because of its limited range in the Black Hills, all known populations of Trailing clubmoss should be considered a high priority for special management attention. A monitoring program should be established to detect possible range shifts and additional areas of potential habitat should be surveyed.
Black Hills Ecoregion Planning Units: Northwestern Foothills, Northern Limestone Plateau, Northern Central Core.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-001	AB	1993	Cement Creek/Sand Creek Headwaters	AB rank may be too high.
SD-001	A	1988	Bear Beaver Gulch	
SD-002	B	1988	Bear Beaver Gulch	
SD-003	B	1989	Bear Butte Creek	

Platanthera orbiculata **Large round-leaved orchid**
Synonym: *Habenaria orbiculata*
Heritage Rank: G5/S1(WY)/S1(SD)
Range Comments: Disjunct. Occurs from Alaska to Newfoundland, south to North Carolina, Minnesota, and Washington, with disjunct populations in the Black Hills (Crook County, WY and Pennington and Lawrence Counties, SD).
Habitat: *Betula papyrifera/Corylus cornuta/ Picea glauca* or *Pinus ponderosa/Ostrya virginiana/Corylus cornuta* forest communities in drainage bottoms or north-facing slopes and benches.
Sensitivity: The small size of all known populations makes this species vulnerable to over-collection by orchid-fanciers and impacts from grazing, logging, road-building, and chance accidents.
Status in the Black Hills: USFS Region 2 Sensitive. Currently known from 12 extant and 1 historical populations in the Black Hills, including 3 sites first discovered in Wyoming in 1997.
Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. At least 5 high-quality occurrences should be conserved in the Black Hills, of which at least one should be in Wyoming. Surveys should be conducted to locate additional habitat and monitoring of known sites should continue.
Black Hills Ecoregion Planning Units: Bear Lodge Mountains, Eastern Foothills, Northern Limestone Plateau, Southern Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-001	BC	2000	Bear Lodge/Beaver Creek	
WY-002	D	1998	Bear Lodge/Beaver Creek	
WY-003	BC	2000	Bear Lodge/Beaver Creek	Formerly included in EO # WY-001.
SD-001	H	1929		
SD-002	C?	1987	High Granite Region	
SD-003	A	1990	Bear-Beaver Gulch	
SD-004	E	1994		
SD-005	E	1994	Bear-Beaver Gulch	
SD-006	B?	1994	Spearfish Creek	
SD-007	E	1994		
SD-008	E	1994		
SD-009	E	1994		
SD-010	B?	1999		
SD-011	E	1999		

***Salix serissima* Autumn willow**
Heritage Rank: G4/S1(SD)
Range Comments: Disjunct. Distributed in boreal North America south to New Jersey, Minnesota, Montana, southeast Wyoming, and Colorado. Black Hills populations are limited to Lawrence and Pennington counties, South Dakota.
Habitat: Grows in cold, often calcareous bogs, limy swamps, boggy meadows, and along lakeshores and streambanks at low to mid elevations. In South Dakota, it is found in saturated, organic soils with *Salix phylicifolia, S. candida, S. bebbiana, Betula glandulosa, Potentilla fruticosa, Carex nebraskensis, C. prarisa* and *C. interior.*
Sensitivity: Vulnerable due to rarity and potential threats to its riparian habitat (e.g. exotic weed invasion & control, snowmobile trail through one site, other human impacts).
Status in the Black Hills: USFS Region 2 Sensitive Species. Known from 2 recent and 1 historical records in South Dakota.
Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. All known populations should be priority for conservation.
Black Hills Ecoregion Planning Units: Southern Central Core, Northern Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	H	1960		1 mi N of Nahant
SD-002	A	1984	Castle Creek	FS Botanical Area
SD-003	BC	1986	Bulldog Ranch?	

***Viola selkirkii* Great-spurred violet**
Heritage Rank: G5?/S1 (SD)
Range Comments: Disjunct. Circumboreal – Labrador to Alaska, south to Pennsylvania, northern Ohio, Wisconsin, Minnesota, South Dakota, British Columbia. In the Black Hills, known only from the high elevation granite of the Central Core in Custer and Lawrence counties.
Habitat: Rare in cool, shaded ravines and north facing rock outcrops. In the Black Hills, found associated with mosses, *Dodecatheon, Adoxa* and *Frageria.*
Sensitivity: Vulnerable due to rarity and narrow range of tolerance.
Status in the Black Hills: USFS Region 2 Sensitive Species. Prior to 2000, this species was known from 2 extant populations and 2 historical records. Hollis Marriott located 5 new populations while surveying the Black Elk Wilderness in 2000.
Conservation Goals in the Black Hills: Minimum of five "A" or "B" quality occurrences or more if lower quality. Inventory of Black Elk Wilderness currently in progress. Stratify where possible to distribute throughout range of species.
Black Hills Ecoregion Planning Units: Southern Central Core, Northern Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	H	1967		
SD-002	H	1975		Deer Mountain
SD-003	B?	1991	Sunday Gulch	
SD-004	AB	1993	Needles	
HM-001	A	2000	Black Elk Wilderness – Upper Pine Creek	T2S R5E, sec 10 SE1/4
HM-002	A	2000	Black Elk Wilderness – Harney Peak	T2S R5E, sec 21 NW1/4, sec 16 SW1/4
HM-003	A	2000	Black Elk Wilderness – Elk Horn West	T2S R5E, sec 9 SE1/4
HM-004	AB	2000	Custer SP – Cathedral Spires	T2S R5E, sec 28 NW1/4
HM-005	A	2000	Custer SP – Middle Earth	T2S R5E, sec 30 NW1/4

Secondary Plant Targets

Global Name	Common Name	Global Code	Global Rank
Adoxa moschatellina	Musk-root	PDADO01010	G5
Asplenium trichomanes	Maidenhair Spleenwort	PPASP021K0	G5
Asplenium viride	Green Spleenwort	PPASP02250	G4
Carex bella	Elegant Sedge	PMCYP031N0	G5
Carex leptalea	Bristly-stalk Sedge	PMCYP037E0	G5
Carex pedunculata	Longstalk Sedge	PMCYP03AA0	G5
Cryptantha cana	Mountain Cat's-eye	PDBOR0A0D0	G5
Cryptogramma acrostichoides	American Rock-brake	PPADI0B030	G5
Cypripedium calceolus var pubescens	Large Yellow Ladies Slipper	BHPLAN001	G5
Eleocharis rostellata	Beaked Spikerush	PMCYP091P0	G5
Equisetum sylvaticum	Woodland Horsetail	PPEQU01090	G5
Equisetum variegatum	Variegated Horsetail	PPEQU010B0	G5
Eustoma russellianum	Showy Prairie-gentian	PDGEN04030	G5
Lesquerella arenosa var argillosa	Secund Bladderpod	PDBRA1N042	G5T2T3
Listera convallarioides	Broad-leaved Twayblade	PMORC1N050	G5
Lycopodium annotinum	Stiff Clubmoss	PPLYC01030	G5
Lycopodium dendroideum	Treelike Clubmoss	PPLYC010B0	G5
Muhlenbergia glomerata	Marsh Muhly	PMPOA480U0	G5
Pedicularis procera	Gray's Lousewort	PDSCR1K0W0	G4G5
Pellaea gastonyi	No Common Name	PPADI0H0G0	G2G4
Petasites sagittatus	Arrow-leaved Sweet-coltsfoot	PDAST71040	G5
Pinus flexilis	Limber Pine	PGPIN040F0	G5
Polystichum lonchitis	Northern Holly-fern	PPDRY0R0F0	G5
Salix candida	Hoary Willow	PDSAL020K0	G5
Sanguinaria canadensis	Bloodroot	PDPAP0M010	G5
Scirpus atrocinctus	Black-girdle Bulrush	PMCYP0Q040	G5
Vaccinium membranaceum	Square-twigged Huckleberry	PDERI180K0	G5

Adoxa moschatellina **Moschatel**
Heritage Rank: G5/S1 (WY)/S2 (SD)
Range Comments: Found from New York to Iowa, South Dakota, Wyoming and the Rocky Mountains to New Mexico. In South Dakota, found only in the Black Hills. In Wyoming, found in the Yellowstone Plateau, Black Hills, and Bighorn, Absaroka, and Medicine Bow ranges (Albany, Crook, Park, Sheridan, and Washakie counties). Distribution is sparse in the Black Hills.
Habitat: Black Hills populations are found in semi-shady, moss-covered igneous or limestone talus slopes.
Sensitivity: Populations are often small and restricted to specialized, cool, moist habitats that may be vulnerable to surface disturbances from logging, road-building, and recreational activities. It is often overlooked due to its inconspicuous nature.
Status in the Black Hills: In Wyoming, two small populations are found in the Upper Sand Creek Special Botanical Area and Sand Creek Late Successional Landscape on Black Hills National Forest. The largest colony contains 300-400 plants in small patches. In South Dakota, recent occurrences are found along Slate and Spring Creeks and in the Needles area. Populations are very small, numbering 25-50 plants.
Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. Due to the scarcity of this plant in the South Dakota Black Hills, one or both of the Wyoming populations should be considered targets for special management attention. All recently seen South Dakota occurrences should be considered for conservation.

Black Hills Ecoregion Planning Units: Northwestern Foothills, Eastern Foothills, Northern Limestone Plateau, Southern Limestone Plateau, North Central Core, South Central Core.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-001	B	1991	Sand Creek Botanical Area	
WY-010	E	1990	Cranberry Springs	
SD-003		1926		
SD-004		1960		
SD-005		1973		
SD-006		1924		
SD-007		1969		
SD-008		1993	Slate Creek	
SD-009		1993	Spring Creek	
SD-010		1994		
SD-011		1994		
SD-012		1994		
SD-013		1993	Needles	
SD-014		1993	Needles	
SD-015		1993		

Asplenium trichomanes **Maidenhair Spleenwort**
Heritage Rank: G5/S2 (SD)
Range Comments: Widespread but uncommon in the Black Hills, not found at all in the Wyoming Black Hills. Found from Newfoundland to southern Ontario, eastern Minnesota, south to Georgia, Alabama, Arkansas, and eastern Oklahoma. Also found in the SD Black Hills, Wyoming, south to west in Texas, New Mexico and eastern Arizona. Also western British Columbia, Oregon and northern California.
Habitat: Uncommon at high elevations in the granitic core of the central Black Hills. Found in moist, mostly shaded granite crevices.
Sensitivity: Unknown.
Status in Black Hills: In South Dakota, known from few recently observed locations.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Recommend conservation of recently seen occurrences.
Black Hills Ecoregion Planning Units: Southern Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001		1929		
SD-002		1892	Sylvan Lake	
SD-003	A	1987		
SD-004		1987		
SD-005		1993		

Asplenium viride **Green Spleenwort**
Synonym: *A. trichomanes-ramosum*
Heritage Rank: G4/S2 (SD)
Range Comments: Widespread but uncommon in the Black Hills. Not found at all in the Wyoming Black Hills. Found from Newfoundland to southern Ontario, eastern Minnesota, south to Georgia, Alabama, Arkansas, and eastern Oklahoma. Also found in the SD Black Hills, Wyoming, south to west in Texas, New Mexico and eastern Arizona. Also western British Columbia, Oregon and northern California.
Habitat: Uncommon at high elevations in the granitic core of the central Black Hills. Found in moist, mostly shaded granite crevices.
Sensitivity: Unknown.

Status in Black Hills: In South Dakota, known from few recently observed locations.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Recommend conservation of recently seen occurrences.
Black Hills Ecoregion Planning Units: Southern Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001		1989		
SD-002	B	1986		
SD-003		1975		
SD-004	A	1989	Spearfish Canyon	EO recommended for conservation attention.
SD-005		1975		

Carex bella **Elegant Sedge**
Heritage Rank: G5/S1 (SD)
Range Comments: Disjunct. Found in the South Dakota Black Hills and also in New Mexico, Arizona and Mexico. Not known from the Wyoming Black Hills.
Habitat: Found on wet soils in mountain areas.
Sensitivity: Unknown.
Status in Black Hills: In South Dakota, known from only one location in Custer county.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Recommend conservation of recently seen occurrences.
Black Hills Ecoregion Planning Units: Southern Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001		1973	Sylvan Lake	

Carex leptalea **Bristly-stalk Sedge**
Heritage Rank: G5/S2 (SD)
Range Comments: Widespread. Found mainly in North and South Dakota. Also known from Newfoundland to Alaska, south to Florida, Texas and California. Not known from the Wyoming Black Hills.
Habitat: Found in dry to wet woods.
Sensitivity: Unknown.
Status in Black Hills: In South Dakota Black Hills, known from several location.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Recommend conservation of high ranking occurrences.
Black Hills Ecoregion Planning Units: Northern Limestone Plateau, Northern Central Core, Southern Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	B	1983		
SD-002		1924		
SD-003	A	1983	Black Fox	
SD-004	B	1989		
SD-005	BC	1990		
SD-006		1993		
SD-007		1993		

Carex pedunculata **Longstalk Sedge**
Heritage Rank: G5/S3 (SD)
Range Comments: Known from Newfoundland to Saskatchewan and the South Dakota Black Hills, south to North Carolina, Alabama and Iowa. Not known in Wyoming.
Habitat: Uncommon at mid to high elevations in the northern and central Black Hills. Found in moist, heavily shaded canyon bottoms and slopes in rich deciduous or coniferous forested areas.
Sensitivity: Unknown.
Status in Black Hills: USFS Region 2 Sensitive Species. Recent plant surveys indicate that it is more common than initially thought.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Recommend conservation of high ranking occurrences.
Black Hills Ecoregion Planning Units: Northern Limestone Plateau, Eastern Foothills, Northern Central Core, Southern Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-002	AB	1990		Large population
SD-003	B	1990		
SD-004		1994		
SD-005		1994	Spearfish Creek	
SD-006		1994	Spearfish Creek	
SD-007		1994	Spearfish Creek	
SD-008		1994	Spearfish Creek	
SD-009		1994		
SD-010		1994		
SD-011		1994		
SD-012		1994		
SD-013		1994		
SD-014		1994		
SD-015		1994		
SD-016		1994		
SD-017		1994		
SD-018		1994		
SD-019		1993		
SD-020		1993		
SD-021		1994		
SD-022		1993		
SD-023		1993	Needles South	

Cryptantha cana **Dog cryptantha**
Heritage Rank: G5/S3 (SD)/ S3 (WY, not tracked)
Range Comments: Regional endemic of the northwestern Great Plains and Wyoming Basins. In Wyoming, known from Big Horn, Campbell, Converse, Fremont, Goshen, Laramie, Niobrara, Platte, and Weston counties. In South Dakota Black Hills, known only from Custer and Fall River counties.
Habitat: Found mostly on eroded sandstone or limestone bluffs and outcrops on sandy to clay-rich soils.
Sensitivity: Threats are low at most sites.
Status in Black Hills: Dog cryptantha is known from at least two locations along the western edge of the ecoregion in Weston County, Wyoming. It is known from only a few locations in South Dakota Black Hills and some are very old sightings. This species is much more widespread in the adjacent Northern Great Plains and Wyoming Basins ecoregions, however, it is of conservation concern in the Black Hills due to the limited distribution.
Conservation Goals in Black Hills: Although the default goal for all plant targets is 5 occurrences, because there is only one known occurrence of this species, the goal is to protect the known occurrence and to

support survey to identify additional occurrences. No Wyoming sites in the Black Hills are recommended for conservation attention. High ranking sites in South Dakota are recommended for conservation attention.
Black Hills Ecoregion Planning Units: Southwestern Foothills.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001		1970		
SD-002		1978		
SD-003		1938		
SD-004	A	1985	Cheyenne River Canyon	
SD-005	A	1984		
SD-006	C	1984		
SD-007		1993		
SD-008		1993		

***Cryptogramma acrostichoides* American Rock-brake**
Heritage Rank: G5/SU (SD)
Range Comments: Peripheral. Found from Canada and Alaska, south to Arizona, New Mexico, east to Minnesota and Michigan.
Habitat: Found on noncalcareous cliff crevices, rock outcrops, and talus, often in relatively dry habitats, typically montane but occurring in lowland to alpine habitats.
Sensitivity: Unknown.
Status in Black Hills: Known from only one location in the Black Hills.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Recommend conservation attention to the single occurrence in Spearfish Creek.
Black Hills Ecoregion Planning Units: North Central Core.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001		1994	Spearfish Creek	

***Cypripedium calceolus* var. *pubescens* Large yellow ladies-slipper**
Synonym: *Cypripedium pubescens*
Heritage Rank: G5/S1S2 (WY)
Range Comments: Disjunct. In Wyoming, known from the Black Hills, Bighorn Range, and Wind River Range in Big Horn, Crook, Fremont, Sheridan, and Washakie counties.
Habitat: The Wyoming Black Hills population occurs along a well-shaded stream in a grove of *Quercus macrocarpa*.
Sensitivity: Potentially highly threatened from over-collection by orchid-fanciers, grazing, logging, mining, and road-building activities.
Status in the Black Hills: Known from a single population of 3 plants, first observed in 1993 during a Wyoming Native Plant Society field trip. This population is located near the boundary of the Dugout Gulch Special Botanical Area.
Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. The Dugout Gulch population represents the only occurrence of this species in the Northwestern Foothills subregion of the ecoregion and should be a priority for management attention.
Black Hills Ecoregion Planning Units: Northwestern Foothills.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-008	BC	1993	Dugout Gulch	EO recommended for conservation attention despite small size.

Eleocharis rostellata **Beaked Spikerush**
Heritage Rank: G5/S1 (SD)
Range Comments: Known from Nova Scotia to British Columbia, south to Florida and Texas. Also found in Mexico. In the Great Plains, known from South Dakota, North Dakota, Nebraska, Kansas, Oklahoma and Texas.
Habitat: Found in wet sedge meadows, seeping areas and on marshy ground.
Sensitivity: Unknown.
Status in Black Hills: Locally abundant on travertine ledges along lower Cascade Creek near Cascade Falls in the southern Black Hills.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Protect the single known occurrence at Cheyenne River Canyons.
Black Hills Ecoregion Planning Units: Southwestern Foothills.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	A	1983	Cheyenne River Canyons	EO recommended for conservation attention.

Equisetum sylvaticum **Woodland horsetail**
Heritage Rank: G5/S1 (WY) (not tracked in SD)
Range Comments: Disjunct. In Wyoming, Woodland horsetail is found in the Black Hills (Crook County) and Bighorn Range (Sheridan County).
Habitat: In the Black Hills, this species is found along creeks and beaver ponds in *Betula papyrifera/Corylus cornuta* forests. The Bighorn Mountain population occurs in hummocky *Carex* bogs, shady *Picea engelmannii/Ledum glandulosum/Vaccinium scoparium* forests, or shady, mud-lined pools.
Sensitivity: Populations may be vulnerable to habitat loss from wetland draining, logging, or recreational activity.
Status in the Black Hills: This species is known from two occurrences in the WY Black Hills in Upper Sand Creek and the Bear Lodge Mountains (upper East Creek drainage). Neither population is found in an area receiving special management attention. No population estimates have been made at these sites.
Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. This species is not tracked by the South Dakota Natural Heritage Program. Both Wyoming populations should be considered targets for conservation attention unless Woodland horsetail is deemed sufficiently abundant or unthreatened in the entire ecoregion to be dropped as a candidate.
Black Hills Ecoregion Planning Units: Bear Lodge Mountains and Northwestern Foothills.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-001	E	1999	Bear Lodge/Beaver Creek	EO recommended for conservation attention.
WY-002	E	1993	Cement Creek/Sand Creek Headwaters	EO recommended for conservation attention.

Equisetum variegatum **Variegated Horesetail**
Heritage Rank: G5/S1 (SD)
Range Comments: Circumboreal, south in North America to Pennsylvania, Illinois, Minnesota, Colorado, Utah and Oregon. Peripheral in the Black Hills.
Habitat: Found in wet lakeshores, on stream banks and swampy ground.
Sensitivity: Unknown.
Status in Black Hills: Known from only one location in the Black Hills.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Protect the single known occurrence.

Black Hills Ecoregion Planning Units: Eastern Foothills
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001		1989	Bear-Beaver Gulch	

Eustoma russellianum **Showy Prairie-gentian**
Synonym: ***E. grandiflorum***
Heritage Rank: G5/S1 (SD)
Range Comments: Regionally endemic. Found in southwestern South Dakota, Nebraska, eastern Colorado, south to Texas.
Habitat: Found in moist meadows and prairies.
Sensitivity: Unknown.
Status in Black Hills: Known from only one location in the Cheyenne River Canyons.
Conservation Goals in Black Hills: R The default conservation goal for all plant targets is 5 occurrences. ecommend conservation attention for the single occurrence in the Cheyenne River Canyons.
Black Hills Ecoregion Planning Units: Southwestern Foothills.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	C	1983	Cheyenne River Canyons	

Lesquerella arenosa **var** ***argillosa*** **Secund Bladderpod**
Heritage Rank: G5T2T3/S3 (SD)
Range Comments: Regionally endemic. Endemic to E Wyoming (Converse and Niobrara Co.), SW South Dakota, and W Nebraska.
Habitat: Dry, open rock outcrops of gravel, shale, or limestone and barren, often seleniferous, roadsides. Elev. 4200-4300 ft.
Sensitivity: Unknown.
Status in Black Hills: No known occurrences in Wyoming. This target occurs primarily outside the Black Hills. However, it does occur on The Nature Conservancy's Cascade Creek preserve at Cheyenne River Canyons and also within the Red Valley probably all the way up the east side of the Black Hills.
Conservation Goals in Black Hills: Protect 5 or more occurrences in the Black Hills, including the occurrence at Cheyenne River Canyons.
Black Hills Ecoregion Planning Units: Eastern Foothills, Southwestern Foothills, South Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001		?		
SD-002		1895		
SD-003		1927		
SD-004		1927		
SD-005		?	Cheyenne River Canyons	
SD-009		1914		
SD-010		1967		
SD-011		1927		
SD-013		1914		
SD-014		1937		
SD-015	B	1985	Cheyenne River Canyons	EO recommended for conservation attention.
SD-016		1953		

Listera convallarioides **Broad-leaved Twayblade**
Heritage Rank: G5/S1 (SD)
Range Comments: Disjunct in the Black Hills. Known from British Columbia to Newfoundland, south to New York, northern Michigan, northeastern Minnesota, the Black Hills and the in the mountains to Utah, Colorado and California.
Habitat: Found in moist coniferous woods and bogs.
Sensitivity: Unknown.
Status in Black Hills: Known from only 2 locations.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Recommend conservation attention for one A ranked occurrence found at Englewood Springs.
Black Hills Ecoregion Planning Units: North Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	A	1983	Englewood Springs	EO recommended for conservation attention.
SD-002		1994		

Lycopodium annotinum **Stiff clubmoss**
Heritage Rank: G5/S1 (SD)/S2 (WY, not tracked)
Range Comments: Sparse in the Black Hills. Is a circumboreal species that is widely distributed from Greenland and Labrador to Alaska, south to the northwestern United States, Wyoming, Colorado, the Great Lakes States, New England, and along the Appalachians.
Habitat: In the Black Hills, Stiff clubmoss is found in White spruce forests with Hazelnut and blueberry. Elsewhere in the state, it is found mostly in moist Engelmann spruce-Subalpine fir forests or the edge of boggy meadows.
Sensitivity: This species may be threatened by over-collection for "Christmas greens" or habitat loss due to road-building, logging, or recreation.
Status in Black Hills: The only population in the Wyoming Black Hills is found within the Upper Sand Creek Special Botanical Area. Hollis Marriott observed 3 patches here in 1989 covering 100, 200 and 1500 square meters. In South Dakota, known from two locations.
Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. All three known locations are recommended for conservation attention.
Black Hills Ecoregion Planning Units: Northern Limestone Plateau, North Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-001	A	1989	Cement Creek/Sand Creek Headwaters	EO recommended for conservation attention.
SD-001	B	1989	Bear Butte Creek	EO recommended for conservation attention.
SD-002	B	1989	Bear Beaver Gulch	EO recommended for conservation attention.

Lycopodium dendroideum **Treelike clubmoss or Round-branched Ground Pine**
Heritage Rank: G5/S1 (WY)/S2 (SD)
Range Comments: Disjunct. Is circumboreal species that is found south in North America to West Virginia, Michigan, Illinois, eastern Minnesota, southwestern South Dakota, western Montana and Oregon.
Habitat: Populations are found primarily in *Betula papyrifera/Corylus cornuta* forests on north-facing slopes with organic-rich soils derived from sandstone. Often found near perennial or intermittent streams.
Sensitivity: Small population size makes this species vulnerable to large scale disturbances associated with road-building, logging, and recreational activities.

Status in the Black Hills: USFS Region 2 Sensitive Species. There are four main populations (totaling at least 9 subpopulations) in the Wyoming Black Hills. Three of these populations have been discovered in surveys of potential timber sales since 1997. The largest known populations contain 150-200 above-ground stems in areas of about 200 square meters. Due to the plant's rhizomatous nature, however, these stems may represent one or a few genetically-distinct individuals. Wyoming populations are all on National Forest lands managed for multiple use. In South Dakota, found in a scattering of locations along the border of the Eastern Foothills and Northern Limestone Plateau.

Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. All high ranking occurrences are recommended for conservation attention. The subpopulations in the Cook Lake area appear to be the largest in WY and are probably the best suited for special attention (other occurrences are in areas planned for timber harvest).

Black Hills Ecoregion Planning Units: Bear Lodge Mountains, Eastern Foothills, Northern Limestone Plateau, North Central Core

Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-001	B	1993	Bear Lodge/Beaver Creek	
WY-002	BC	1993	Bear Lodge/Beaver Creek	
WY-003	A	1993	Bear Lodge/Beaver Creek	EO recommended for conservation attention.
WY-004	AB	1994	Bear Lodge/Beaver Creek	EO recommended for conservation attention.
WY-005	BC	1997	Bear Lodge/Beaver Creek	
WY-006	B	1997	Bear Lodge/Beaver Creek	
WY-007	BC	1997	Bear Lodge/Beaver Creek	
WY-008	BC	1997	Bear Lodge/Beaver Creek	
WY-009	B	1998	Bear Lodge/Beaver Creek	
SD-001		?		
SD-002		1930		
SD-003	B	1989	Bear Butte Creek	EO recommended for conservation attention.
SD-004		1988		
SD-005	BC	1999		
SD-006	BC	1989	Bear-Beaver Gulch	
SD-007		1989		
SD-008	B	1990	Polo Peak Project	
SD-009		1990	Higgins Gulch	
SD-010		1991	Higgins Gulch	
SD-011		1994		
SD-012		1994		
SD-013		1994		
SD-014		1994		
SD-015		1994		
SD-016		1994		
SD-017		1993		
SD-018		1993		
SD-019		1993		
SD-020		1993		
SD-021		1993		
SD-022		1993		
SD-023		1993		
SD-024		1993		
SD-025		1999		
SD-026		1999		
SD-027		1999		
SD-028		1999		

Muhlenbergia glomerata **Marsh muhly**
Heritage Rank: G5/S1 (WY)/S? (SD)
Range Comments: Sparse. In the Black Hills, restricted to the northern Hills and Bear Lodge Mountains. Known from Quebec to British Columbia, south to West Virginia, Indiana, Utah and Oregon.
Habitat: Populations in the Black Hills have been found in canyon bottoms and wet meadows above beaver dams.
Sensitivity: Populations could be vulnerable to draining of wetlands or other surface – disturbing activities. Impacts from grazing are poorly known in the Black Hills, but appear to be low at several sites.
Status in the Black Hills: USFS Region 2 Sensitive Species. The Forest Service has recently called the conservation status of this species into question with a couple of observations and collections from very atypical habitat that could lead to this species being much more widespread in the Black Hills than previously thought. Potential habitat has been identified by Ted Toombs in the Little Beaver Spring area of the Bear Lodge Mountains, but a survey is needed for confirmation.
Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. Both Wyoming populations in the ecoregion should be considered for special management and should be high priorities for resurvey and monitoring. Additional areas of potential habitat need to be inventoried on Black Hills National Forest. Such inventories should be conducted in late summer when this species is most likely to be in flower (and is most recognizable).
Black Hills Ecoregion Planning Units: Bear Lodge Mountains, Northwestern Foothills, Eastern Foothills, Northern Limestone Plateau, South Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-002	E	1984	Upper Sand Creek	EO recommended for conservation attention, but more population information needed.
WY-003	E	1980	Bear Lodge/Beaver Creek	EO recommended for conservation attention, but more population information needed.
SD-001		1994		
SD-002		1994	Spearfish Creek	
SD-003		1994		

Pedicularis procera **Gray's Lousewort**
Heritage Rank: G4G5/S2 (SD)
Range Comments: Regionally endemic. Known from Black Hills to western Nebraska, south central Wyoming, south through Colorado and eastern Utah to western New Mexico and central Arizona.
Habitat: Found in moderately moist woods and edges of meadows.
Sensitivity: Unknown.
Status in Black Hills: Unknown. Found only at a few locations in South Dakota.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences.
Black Hills Ecoregion Planning Units: Southern Limestone Plateau, South Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001		?		
SD-002		1924		
SD-003		1967		
SD-004		1970		
SD-005		1996		
SD-006		1993		
SD-007		1994		

Petasites sagittatus **Arrow-leaved Sweet-coltsfoot**
Heritage Rank: G5/S1 (SD)
Range Comments: Disjunct. Found from Labrador to Alaska, south to Wisconsin, Minnesota, South Dakota Black Hills, Colorado, Idaho, and Washington.
Habitat: Uncommon but locally abundant at mid elevations in the northern and central Black Hills. Found in open or shaded boggy habitats along streams, usually found in peat substrate.
Sensitivity: Unknown.
Status in Black Hills: Known recently from only a few locations in South Dakota.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Two high ranking occurrences are recommended for conservation attention.
Black Hills Ecoregion Planning Units:
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	A	1993	Black Fox	EO recommended for conservation attention.
SD-002	B	1986	Camp Paha Sapa	EO recommended for conservation attention.
SD-003	X	1928		
SD-004		1994		
SD-005		1988	Black Fox	

Pinus flexilis **Limber Pine**
Heritage Rank: G5/S2 (SD)
Range Comments: Known from western South Dakota to southwestern North Dakota (both as single, isolated stands) to southeastern British Columbia and southwestern Alberta, south to northern New Mexico, Arizona and California. In the Black Hills, limited to one location in Cathedral Spires.
Habitat: Occurs only in an approximately 20 acre area of the Black Hills in Cathedral Spires at approximately 6600-6800 ft. in elevation, south of Harney Peak.
Sensitivity: Vulnerable to blister rust disease.
Status in Black Hills: Known from only one location in Cathedral Spires. It occurs in open stands among the spires and appears to be reproducing adequately.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Protect single location.
Black Hills Ecoregion Planning Units: South Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001		1981	Sylvan Lake	

Polystichum lonchitis **Mountain holly-fern**
Heritage Rank: G5/S1 (SD)/S2 (WY, not tracked)
Range Comments: Is a circumboreal species, found North America to Newfoundland, Quebec, western South Dakota, Wyoming, New Mexico, Arizona and California. In the Black Hills, found only in the Northern hills in Lawrence county (SD) and Crook county (WY).
Habitat: Found in deep, shady ravines with *Betula papyrifera* and *Corylus cornuta*. Also found in moist streambanks and draws dominated by *Abies lasiocarpa*, limestone boulder fields, or shrubby thickets on talus.
Sensitivity: Populations are extremely small and thus potentially highly vulnerable to over-collection or disturbance.
Status in the Black Hills: Known from two small populations on the Wyoming side of the Black Hills. One population in the Dugout Gulch area consisted of a single plant when it was discovered by Robert Dorn in 1977. A second colony was discovered in the Upper Sand Creek area by Hollis Marriott in 1990 and contained 40-50 individuals (Marriott 1991). Both populations are found in or immediately adjacent to the

Upper Sand Creek and Dugout Gulch Special Botanical areas. In South Dakota, found at a few locations along Spearfish Creek, Higgins Gulch and Bear Beaver Gulch.
Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. High ranking occurrences are recommended for conservation attention.
Black Hills Ecoregion Planning Units: Northwestern Foothills, Eastern Foothills, Northern Limestone Plateau.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-001	C	1997	Dugout Gulch	EO recommended for conservation attention.
WY-002	A	1991	Sand Creek Botanical Area	EO recommended for conservation attention.
SD-001	B	1989	Little Spearfish Creek	EO recommended for conservation attention.
SD-002	B	1989	Bear-Beaver Gulch	EO recommended for conservation attention.
SD-003		1994	Higgins Gulch	
SD-004	B	1990	Bear-Beaver Gulch	EO recommended for conservation attention.
SD-005		1998	Little Spearfish Creek	

Salix candida **Hoary Willow**
Heritage Rank: G5/S1 (SD)
Range Comments: Known from Labrador to Alaska, south to New Jersey, Pennsylvania, Ohio, Illinois, northern Iowa, northeastern and Black Hills South Dakota, Idaho and southern British Columbia.
Habitat: Found in fen areas associated with marshes, streams and springs.
Sensitivity: Unknown.
Status in Black Hills: Locally common at McIntosh Fen, a large calcareous seepage and spring discharge area bordering Castle Creek upstream from Deerfield in western Pennington county. This population is over 300 miles from the next-nearest populations in northeast South Dakota and central North Dakota.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Single occurrence at McIntosh Fen is recommended for conservation attention.
Black Hills Ecoregion Planning Units: South Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	A	1984	McIntosh Fen	EO recommended for conservation attention.

Sanguinaria canadensis **Bloodroot**
Heritage Rank: G5/S4? (SD)
Range Comments: Nova Scotia to Manitoba, south to Florida, Louisiana and Texas. In the Black Hills, restricted to Lawrence county, SD.
Habitat: Found in the moist understory of deciduous or mixed forest and thickets in drainage ways, often beneath bur oak, ironwood, birch and beaked hazel.
Sensitivity: Unknown.
Status in Black Hills: USFS Region 2 Sensitive Species. Uncommon and local at low to mid elevations in the northeast Black Hills (Lawrence county SD). These populations are isolated from the nearest populations in the extreme eastern Dakotas. Although listed as a sensitive species, it is fairly common at some localities.
Conservation Goals in Black Hills: The default conservation goal for all plant targets is 5 occurrences. Protect high ranking occurrences.

Black Hills Ecoregion Planning Units: Eastern Foothills, Northern Limestone Plateau, North Central Core

Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	A	1999		EO recommended for conservation attention.
SD-002	C	1990	Polo Peak Project	
SD-003	D	1990	Polo Peak Project	
SD-004		1927		
SD-005		1922		
SD-006		1993		
SD-007		1993		
SD-008		1993		
SD-009		1993		
SD-010		1993		
SD-011		1993		
SD-012		1993		
SD-013		1994		
SD-014		1994		
SD-015		1994		
SD-016		1994		
SD-017		1994		
SD-018		1994		
SD-019		1994		
SD-020		1994		
SD-021		1999		

Scirpus atrocinctus **Cottongrass bulrush or Woolrush**

Synonym: *Scirpus cyperinus*

Heritage Rank: G5/S1 (WY) (not tracked in SD)

Range Comments: Disjunct. In Wyoming, this species is restricted to the Black Hills in Crook County and one small population along a roadside in Yellowstone National Park (Teton County).

Habitat: Populations are found primarily along streams, beaver ponds, and springs in open, wet meadows, or *Betula papyrifera* and *Populus tremuloides*/*Salix* swamps with standing water. Despite the presence of large areas of seemingly suitable habitat, most populations are small and restricted to suitable microsites (USDA Black Hills National Forest 1996).

Sensitivity: Impacts from grazing are poorly understood. Other potential threats include habitat disturbance associated with mining and road construction.

Status in the Black Hills: Until 1993, this species was known from only 2 primary locations in Wyoming. Since then, surveys have documented at least nine new populations (and possibly as many as 18) in the Bear Lodge Mountains. Most of these populations are relatively small and contain 10-50 individual clumps in limited areas, although a few large colonies may number as many as 500 clumps. Many colonies are found in the same watersheds, suggesting that gene flow may be less restricted than once presumed. Only one population is currently found within a special management area (Upper Sand Creek Special Botanical Area). This population, however, has not been relocated since 1984 and could be extirpated.

Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. Due to its wide distribution, Cottongrass bulrush may be removed from the US Forest Service Sensitive list. Its status as a target in the Black Hills ecoregion may also warrant reassessment. If it remains a target, at least 2 populations in Wyoming should be identified for conservation. Large populations in the Beaver Creek or North Redwater Creek watersheds in the Bear Lodge Mountains should be considered for special management attention. The Upper Sand Creek population may also warrant recognition, as it is the only one in the Wyoming Black Hills that is currently protected. A re-survey of Sand Creek should be conducted, however, to determine if this colony is still present and viable.

Black Hills Ecoregion Planning Units: Bear Lodge Mountains and Northwestern Foothills.
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
WY-001	B	1994	Bear Lodge/Beaver Creek	
WY-002	X?	1984	Cement Creek/Sand Creek Headwaters	
WY-003	BC	1994	Bear Lodge/Beaver Creek	
WY-004	B	1993	Bear Lodge/Beaver Creek	
WY-007	C	1997	Bear Lodge/Beaver Creek	
WY-008	CD	1997	Bear Lodge/Beaver Creek	
WY-009	BC	1997	Bear Lodge/Beaver Creek	
WY-010	CD	1997	Bear Lodge/Beaver Creek	
WY-011	BC	1997	Bear Lodge/Beaver Creek	
WY-012	C	1997	Bear Lodge/Beaver Creek	
WY-013	CD	1997	Bear Lodge/Beaver Creek	

Vaccinium membranaceum **Thinleaved blueberry**
Heritage Rank: G5/S2 (SD)/S2 (WY, not tracked)
Range Comments: Found from Ontario to northern Michigan, Alberta to British Columbia, south to South Dakota Black Hills, Montana, Idaho and northern California. Considered "Sparse" in Wyoming, where it is restricted to the Gros Ventre and Absaroka mountains (Park and Teton counties) and the Black Hills (Crook County). In South Dakota Black Hills, found in the Lead-Deadwood area.
Habitat: confined mainly to northern slobes above 5,000 ft under ponderosa pine or on rocky outcrops.
Sensitivity: Considered vulnerable to habitat disturbances related to mining activities by Ode and Marriott (1990). Many populations exist at low densities and may only rarely produce seed.
Status in the Black Hills: Thinleaved blueberry is known from a single location in the Wyoming Black Hills along Sand Creek. This occurrence is contained within the Upper Sand Creek Special Botanical Area. Uncommon and local in the Lead-Deadwood area of SD, including Terry Peak in the northern Black Hills.
Conservation Goals in the Black Hills: The default conservation goal for all plant targets is 5 occurrences. The Sand Creek population may be the only one found in the Northwestern Foothills subregion of the Black Hills and should be considered a high priority for protection. All other high ranking occurrences are recommended for conservation attention.
Black Hills Ecoregion Planning Units: Northwestern Foothills, Northern Limestone Plateau, North Central Core
Population Viability Table:

EO#	EORANK	Year Last Observed	Potential Conservation Site(s)	Comments
SD-001	C	1989		
SD-002		1970		
SD-003		1986		
SD-004		1987		
SD-005		1999		
SD-006		1986		
SD-007		1986		
SD-008		1986		
SD-009		1987		
SD-010		1987		
SD-011		1987		
SD-012		1987		
SD-013		1988		
SD-014		1988		
SD-015		1929		
SD-016	A	1989		EO recommended for conservation attention.

SD-017	C	1989		
SD-018		1989		
SD-019		1998		
SD-020		1999		
SD-001	A	1999		EO recommended for conservation attention.
SD-002	C	1990	Polo Peak Project	
SD-003	D	1990	Polo Peak Project	
SD-004		1927		
SD-005		1922		
SD-006		1993		
SD-007		1993		
SD-008		1993		
SD-009		1993		
SD-010		1993		
SD-011		1993		
SD-012		1993		
SD-013		1994		
SD-014		1994		
SD-015		1994		
SD-016		1994		
SD-017		1994		
SD-018		1994		
SD-019		1994		
SD-020		1994		
WY-001	BC	1986	Cement Creek/Sand Creek Headwaters	

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Appendix 3. Animal Target Information for the Black Hills Ecoregion.

This report was compiled by Gary Beauvais (Wyoming Natural Diversity Database), Doug Backlund (South Dakota Natural Heritage Data Base) and Jennifer Hall (The Nature Conservancy) and lists detailed justification for the selection of each target animal species.

The general report structure is as follows:
***Scientific name (*Common name)**
Status: Conservation rank or other designation from Natural Heritage Programs and natural resource agencies. WY = Wyoming; SD = South Dakota; WGFD = Wyoming Game and Fish Department; USFS = U.S. Forest Service; USFWS = U. S. Fish and Wildlife Service.
Justification as target: Reasons why the taxon was included on the targets list.
Habitat: Description of the taxon's preferred or optimal habitat.
Conservation goal: A brief description of the goal, including literature and other sources used to estimate population sizes and distributions. Note that the term "population" is used throughout this report to refer to both discrete populations and population segments. For most vertebrates, a minimal viable population is best expressed in terms of area of suitable habitat. Therefore, conservation goals are presented in terms of "patches" of appropriate habitat that should be encompassed by portfolio sites. Ideally, such patches should include known occurrences. However, because of a paucity of occurrence data for some taxa, some patches will have to encompass suitable habitat only, with the assumption that the target taxon is present within.

Primary Animal Targets

Global Name	Common Name	Global Code	Global Rank
Amblycheila cylindriformis	A Tiger Beetle	IICOL0C010	G5
Catinella gelida	Catinella gelida	IMGAS66120	G2
Catostomus platyrhynchus	Mountain Sucker	AFCJC02160	G5
Cinclus mexicanus	American Dipper	ABPBH01010	G5
Corynorhinus townsendii	Townsend's Big-eared Bat	AMACC08010	G4
Couesius plumbeus	Lake Chub	AFCJB06010	G5
Discus shimeki	Striate Disc	IMGAS54120	G4
Endemic G3 springtail	(Not yet tracked by SD	BHANIM001	G3
Glaucomys sabrinus	Black Hills Flying Squirrel	AMAFB09020	G5
Myotis thysanodes	Fringe-tailed Myotis	AMACC01091	G5T2
Oreohelix strigosa berryi	Berry's Rocky	IMGASB5328	G5T2
Oreohelix strigosa cooperi	Cooper's Rocky	IMGASB5327	G5T1
Oreohelix strigosa new	Pahasapa Mountainsnail	IMGASB5329??	G5T1
Phoxinus neogaeus	Finescale Dace	AFCJB31040	G5
Phyciodes batesii	Tawny Crescent	IILEPK3040	G4
Speyeria atlantis pahasapa	Atlantis Fritillary	IILEPJ6112	G5T3
Storeria occipitomaculata	Black Hills Redbelly	ARADB34033	G5T3
Vertigo arthuri	Dakota Vertigo	IMGAS20050	G2
Vertigo paradoxa	Mystery Vertigo	IMGAS20420	G2G4

***Amblycheila cylindriformis* (A Tiger Beetle)**
Status: G5 / S1 (SD)
Justification as target: Regional endemic, eastern Colorado, western Nebraska, south to eastern New Mexico and the Texas panhandle (Pearson et al 1997). Black Hills population is restricted to sand sage habitat in the Angostura/Cascade Springs area. This is the extreme northernmost occurrence of this species, and may be disjunct. Unlike most tiger beetle species, this species is flightless and nocturnal. Dispersal and colonization potential is very

limited. Paul Johnson, SDSU entomologist, has surveyed the area extensively and reports that high density populations are restricted to the limited habitat available in the Angostura/Cascade Springs area (Johnson 1996).
Habitat: Sand sage habitat, much of this habitat has been converted to grassland or developed.
Conservation goal: Three areas with high-density populations are known, all are in sand sage habitat in the Angostura Reservoir/Cascade Springs area. Paul Johnson reports rough densities of 100 to 120 per acre in the Angostura area and an estimated 3-4 square miles of habitat in the ecoregion. One site is located within the Cheyenne Canyons site. One site is owned by SD GFP Parks Division. The third is on private land just south of Angostura. This species occurs mostly outside the ecoregion so *3 viable populations* should be the conservation goal. This goal can be met with the three populations currently known.

***Catinella gelida* (Catinella gelida)**
Status: G2 / S1 (SD)
Justification as target: Until the discovery of this species in the Black Hills (Frest and Johannes 1991) *Catinella gelida* was known only from 14 sites in the restricted algific talus habitat in northeastern Iowa. Currently, it is known from 8 sites in the Black Hills, but it has been found live at only 3 of these sites. The species was rare at all sites. There is some dispute about the taxonomy of this species. A snail expert in Wisconsin believes that this species could be the same as *Cantinella wandae* and also maybe *C. avara* and would therefore be more common than previously thought (Nekola 2001, pers. comm. with D. Backlund). The planning team decided to consider this a valid species, as described by Frest and use the current rank and status of *C. gelida* – future iterations of ecoregional planning should reevaluate this species as a primary target in the ecoregion.
Habitat: This species is a calcophile. Found in dry, wooded limestone talus, near the base of limestone cliffs or slopes. This species prefers drier habitat than most land snails. Most common vegetation is open pine forest with deciduous trees and shrubs. Rare at all collection sites.
Conservation goal: Viability is difficult to assess. Since the species does occur in another ecoregion but is rare and habitat restricted in both ecoregions, a minimum of *6 viable populations* is the conservation goal. Conservation measures should be liberal. Potential conservation sites are: Spearfish Canyon (3 sites where recent dead specimens recovered, very likely that multiple viable colonies exist), Schoolhouse Gulch (Frest site 18), Reno Gulch (Frest site 64) and Mystic (Frest site 155).

***Catostomus platyrhynchus* (Mountain Sucker)**
Status: G5 / S5 (WY) S5 (SD)
Justification as target: Found in the mountainous regions of North America from central Alberta in the north, the Pacific coast in WA and OR on the west and NV and UT on the south. Disjunct in the Black Hills. Fairly common, but declining. Are not known from many locations compared to historic extent. They are sensitve to habitat degradation from both agriculture and industry and to the introduction of non-native fish into their environment. In the Black Hills, trout are the cause of the population declines.
Habitat: Prefer s clear, cold waters of creeks and rivers with gravel, sand or boulders. They rarely occur in large rivers or lakes.
Conservation goal: Ecoregional occurrences are disjunct from the main range and the taxon is not specialized in its habitat requirements; therefore *3 viable populations* are required for long term persistence.

***Cinclus mexicanus* (American dipper)**
Status: G5 / S4? (WY) S1 (SD). South Dakota Threatened.
Justification as target: Because this taxon is non-migratory and strongly associated with montane streams, the ecoregional population is disjunct from adjacent populations. The South Dakota Heritage Program has documented steep declines in the ecoregional population in recent years (D. Backlund, South Dakota Heritage Program, personal communication).
Habitat: Taxon is specialized to swift flowing montane streams with relatively high production of aquatic insects; infrequently found along shorelines of montane lakes and ponds. Nests are placed directly over or immediately adjacent to the stream on overhanging rocks, cliff ledges, or underneath waterfalls or bridges (AOU 1983).
Conservation goal: Ecoregional occurrences are disjunct from the main range, and the taxon is specialized to high-gradient montane streams; therefore *4 populations* are required for long term persistence. Patches should be distributed as follows: one in the Bear Lodge Mountains and one each in 3 non-foothills planning units. Additionally, each of the 4 patches should fall within a unique ecoregional watershed. Density estimates from other

areas average about 2200m of stream/ breeding pair; this suggests that an unreasonably large patch (220,000 - 302,000 m of stream) is necessary to support 200 - 275 individuals. Therefore, it is recommended that each of the 4 patches encompass as much stream as is practical in the context of other fine-filter and coarse-filter targets. Distributing patches by watershed will help de-couple populations from periodic flooding as well as other disturbances. Minimum patch size, in addition to specifications above, should include a 50m buffer on either side of the stream and should be included in each patch.

***Corynorhinus townsendii (*Townsend's big-eared bat)**
Status: G4 / S1B, S2N (WY) S2S3 (SD). WGFD SSC2. USFS Region 2 and 4 Sensitive.
Justification as target: Large population declines have been recently documented range-wide. As with *M. t. pahasapensis*, the local population of *C. townsendii* is vulnerable because it likely depends on only a few day roosts, maternity roosts, and hibernacula, and is very sensitive to disturbance of such structures. Strongly associated with caves/ abandoned mine shafts.
Habitat: Most often found in desert shrublands and dry coniferous forests (Clark and Stromberg 1987), but may also occur in deciduous forests and mountain-foothills shrublands, Douglas-fir and ponderosa pine forests, and forest-dominated riparian up to 9000 feet (Humphrey and Kunz 1976; Worthington 1991; Wyoming Game and Fish Department 1992). Requires spacious caves for day roosts, maternity colonies, and hibernacula, and is frequently encountered in abandoned mines (Clark and Stromberg 1987; Clark et al.1989).
Conservation goal: A widespread taxon strongly associated with large caves and/ or mine shafts; therefore, *3 populations* are required to ensure long-term persistence. Because this taxon is strongly tied to roosting structures (i.e., caves and mine shafts) that are very local in nature and difficult to associate with particular land cover types, patches selected for the conservation of this taxon should be centered on known roosts. Furthermore, patches should include a buffer of at least 100m around the roost, and also include some foraging habitat (typically ponds, streams, other wetlands) near the roost. The size and shape of each patch should be determined on a case-by-case basis.

***Couesius plumbeus* (Lake Chub)**
Status: G5 / S1 (SD)
Justification as target: The lake chub is a northern, periglacial species that lives in a broad band across Canada and northern United States from Nova Scotia and Labrador to British Columbia and central Alaska. It lives in northern New England, New York, Michigan and Wisconsin to Idaho, Wyoming and Colorado. It is disjunct in the Black Hills. Once abundant in the Black Hills, it is now found at only one remaining location (Deerfield Reservoir). Population declines are primarily the result of the decline of Black Hills steams and streamside vegetation (Backlund 1996). Also affecting populations are pollution from mining and predation by non-native introduced trout.
Habitat: Tolerates a wide variety of habitats, but prefers cool streams, lakes and ponds, apparently moving into deeper water during the summer.
Conservation goal: Ecoregional occurrences are disjunct from the main range and the taxon is not specialized in its habitat requirements; therefore *3 viable populations* are required for long term persistence. However, the species is found at only one remaining site in the Black Hills (Deerfield Reservoir). There are current potential restoration projects by the SD Department of GFP to designate areas as native fisheries.

***Discus shimeki* (Striate Disc)**
Status: G4 / S2 (SD)
Justification as target: This species is reported from many locations in the Rocky Mountain states. Disjunct in the Black Hills. Frest reports that the species is declining rangewide and is very sensitive to disturbance. In Frest's opinion, most Black Hills colonies only survive by happenstance.
Habitat: Rich lowland forest, generally on shaded, north-facing slopes. Most frequent in spruce communities with diverse understory. Most colonies are found on calcareous soils, but one colony was found on schist derived soil. This species requires a moister habitat that most species and is more prone to desiccation if habitat is grazed or logged.
Conservation goal: Viability is difficult to assess. Since the species is known to occur in other ecoregions, a minimum of *3 viable populations* is the conservation goal, but conservation measures should be liberal. Long-term viability of this species is closely tied to the conservation sites of other snail target species: Ditch Creek, Reno

Gulch, and Spearfish Canyon (2 colonies, but likely more). One additional site, Castle Creek (Frest site 118) should be included.

***Glaucomys sabrinus* (Black Hills flying squirrel)**
Status: G5T2Q / S2? (WY) S2 (SD).
Justification as target: The Black Hills population of *G. sabrinus* is likely a Pleistocene relict, and has been completely isolated from adjacent populations for several centuries. Such isolation increases conservation concern for the taxon because (1) it increases the probability of local extinction, and (2) it raises the possibility of genetic divergence (i.e., subspeciation). May prefer late-seral conifer stands, which are relatively rare in the ecoregion.
Habitat: Habitat use of the Black Hills population is not well understood; the below information is from populations in other areas. The taxon generally prefers coniferous and mixed forest, but will use deciduous upland and riparian forest as well. Optimal conditions are generally accepted as cool, moist, mature forest with abundant snags and large downed logs. Rosenberg and Anthony (1992) suggested that northern flying squirrels in western Oregon are habitat generalists with respect to seral stage (abundances were similar in late- and early-seral stands). Although cavities in large trees and snags are preferred den sites, dens have been documented in twig and leaf nests, underground burrows, and even artificial bird houses (Biological and Conservation Database 2000c).
Conservation goal: An ecoregional endemic specialized to forested habitats, possibly preferring mesic and late-seral stands; therefore, *6-8 populations* are required for long term persistence. Patch size should be 67 ha – 92 ha and is based on a median recorded density of 3.0 individuals/ ha in forests of interior western North America (Witt 1992). At least one patch should be located in each non-foothills planning unit. Because this taxon is rather mobile relative to its small patch size, the separation distance should be 4.6 km - 5.6 km, with $\geq$ 2 permanent streams between closest patch edges. This separation distance was increased to 5X the diameter of a minimum circular patch to insulate against disease dispersal.

***Myotis thysanodes pahasapensis* (Fringe-tailed myotis)**
Status: G5T2 / S1B, S1N (WY) S2 (SD). WGFD SSC2. USFS Region 2 Sensitive.
Justification as target: At the species level, this taxon is rare with some indication of recent declines. The subspecies *M. t. pahasapensis* only occurs in the Black Hills and small portions of adjacent ecoregions. It is known to hibernate in the ecoregion, and therefore may not exchange many individuals with larger populations to the west. Like those of other bats, the local population is rather vulnerable because it likely depends on only a few day roosts, maternity roosts, and hibernacula, and is sensitive to disturbance of such structures.
Habitat: Uses a variety of habitats, including coniferous forest, woodlands, shrublands, grasslands, and deserts (Gerhart and Olson 1982, Clark and Stromberg 1987). Generally occurs below 7500 feet elevation in Wyoming. Roosts and nursery colonies are located in caves, abandoned mines, rock crevices, and occasionally old buildings (Wyoming Game and Fish Department 1996; B. Luce, Wyoming Game and Fish Department, personal communication).
Conservation goal: A regional endemic strongly associated with appropriate roosting substrate; therefore, *6-8 populations* are required for long-term persistence. Because this taxon is strongly tied to roosting structures (i.e., caves, crevices, mine shafts) that are very local in nature and difficult to associate with particular land cover types, patches selected for the conservation of this taxon should be centered on known roosts. Furthermore, patches should include a buffer of at least 100m around the roost, and also include some foraging habitat (typically ponds, streams, other wetlands) near the roost.

***Oreohelix strigosa berryi* (Berry's Rocky Mountainsnail)**
Status: G4T2 / S? (WY)
Justification as target: Regional endemic subspecies. Within the ecoregion restricted to undisturbed pine forests with diverse understory of the Bear Lodge Mountains. Also occurs in the Big Snowy Mountains of Montana. Highly sensitive to habitat disturbance, pesticides, herbicides and grazing. Populations highly fragmented and isolated. Note: Frest considers this a full species named *Oreohelix* n. sp. *2,* Bear Lodge mountainsnail, endemic to the Black Hills.
Habitat: Ponderosa pine forest with diverse understory. Restricted to calcareous soils. All sites are on slopes and in drier, more open habitats than the *O. strigosa cooperi* and *O. stigosa* new subspecies sites in the Black Hills.
Conservation goal: Viability is difficult to assess. This subspecies occurs in one other mountain range, the Big Snowy Range in Montana. A minimum of *6 viable populations* is the conservation goal, but conservation measures

should be liberal. Only 5 colonies are known with the ecoregion. All known colonies should be designated conservation sites. Frest's site 54 is the largets site.

***Oreohelix strigosa cooperi* (Cooper's Rocky Mountainsnail)**
Status: G5T1 / S2 (SD)
Justification as target: Endemic subspecies. Restricted to undisturbed pine and spruce forests of the northern limestone plateau. Highly sensitive to habitat disturbance, pesticides, herbicides and grazing. Populations often highly fragmented and isolated. Note: Frest considers this a full species, *Oreohelix cooperi*, Black Hills mountainsnail, endemic to the Black Hills.
Habitat: Undisturbed pine and spruce forests on calcareous soils in the northern and central Black Hills. Usually found in closed canopy forests with a diverse understory. Most colonies are located in canyons on north or east facing slopes. May utilize drier habitats that *Oreohelix strigosa* new subspecies (Frest and Johannes 1993).
Conservation goal: An ecoregion endemic with restricted habitat. Populations are often fragmented and isolated. Extremely limited dispersal potential. All populations are found in the northern limestone plateau. The largest and most numerous colonies are located in the Spearfish Canyon watershed. Viability is difficult to assess. Since the subspecies is endemic to the ecoregion, a minimum of *10 viable populations* is the conservation goal, but conservation measures should be liberal. Spearfish Canyon watershed has 17 known colonies of Cooper's Rocky Mountainsnail. Recommendation is to designate Spearfish Canyon watershed and Black Fox Canyon as conservation sites. If these two sites are protected, long-term survival of the taxon in the ecoregion should be assured.

***Oreohelix strigosa* new subspecies (Pahasapa Mountainsnail)**
Status: G5T1 / S2 (SD)
Justification as target: Endemic subspecies. Restricted to undisturbed pine and spruce forests of the northern limestone plateau. Highly sensitive to habitat disturbance, pesticides, herbicides and grazing. Populations often highly fragmented and isolated. Note: Frest considers this a full species, *Oreohelix* n. sp. 1, Pahasapa mountainsnail, endemic to the Black Hills.
Habitat: Undisturbed pine and spruce forests on calcareous soils in the northern and central Black Hills. Usually found in closed canopy forests with a diverse understory. Most colonies are located in canyons on north or east facing slopes. May be more reliant on moister habitat than *Oreohelix strigosa cooperi* (Frest and Johannes 1993).
Conservation goal: An ecoregion endemic with restricted habitat. Populations are often fragmented and isolated. Extremely limited dispersal potential. All populations are found in the northern limestone plateau. Viability is difficult to assess. This subspecies is endemic to the ecoregion, so a minimum of *10 viable populations* is the conservation goal, but conservation measures should be liberal. The following sites are recommended as conservation sites necessary to ensure the long term survival of the taxon: Spearfish Canyon watershed (7 known colonies), Beaver Creek (2 known colonies), Ditch Creek (3 known colonies), and Schoolhouse Gulch site (Frest's site 18-T4N R1E Sec 4 SE4 SW4). Frest reported the Pahasapa Mountainsnail aboundant at Schoolhouse Gulch.

***Phycoides batesii* (Tawny Crescent)**
Status: G4 / S2 (SD)
Justification as target: Black Hills disjunct, this species is extirpated from much of its former range in the eastern United States. Recent work indicates that the eastern population actually was a different subspecies or possibly a separate species (Schweitzer, pers. comm to D. Backlund, Scott 1994, Scott 1998). *Phyciodes batesii lakota* is the subspecies that occurs in the Black Hills, this subspecies is found from northern Nebraska northward into Canada, east to Michigan and central Ontario.
Habitat: In the Black Hills, woodland margins along streams and moist meadows (Royer and Marrone 1992a). Associated with the zone of transition between deciduous and coniferous forest. Larval host plants are asters (Royer and Marrone 1992a). Scott (1994) reports *Aster laevis* the most important host plant, possibly the only suitable larval host plant for *Phyciodes batesii lakota*.
Conservation goal: This species occurs mostly outside the ecoregion. *Three viable occurrences* should be the conservation goal. A viable population should produce a minimum of 1000 adults in an average year, but preferably up to 3000 adults. Population fluctuations for other butterfly species are often at an order of magnitude. A viable population should be based on a metapopulation, not demes (Schweitzer, pers. comm to D. Backlund).

***Speyeria atlantis pahasapa (*Atlantis Fritillary)**
Status: G5T3 / S3 (SD)
Justification as target: Black Hills endemic subspecies. Habitat is riparian meadows at higher elevations, this habitat is threatened with development and mismanagement.
Habitat: Riparian meadows at higher elevations, most reports from the Deerfield area. As with other *Speyeria* species, the larval food plant is *Viola* species. Not reported to have a preferred larval host plant species.
Conservation goal: Endemic subspecies. *Ten viable populations* should be the conservation goal. A viable population should produce over 1000 adults in an average year, preferably up to 3,000 adults. Population fluctuations for other butterfly species are often at an order of magnitude. A viable population should be based on a metapopulation, not demes (Schweitzer, pers. comm to D. Backlund). Field surveys will be needed to determine conservation sites for 10 viable populations.

***Storeria occipitomaculata pahasapae* (Black Hills redbelly snake)**
Status: G5T3 / S2 (WY) S3 (SD). USFS Region 2 Sensitive.
Justification as target: Taxon is endemic to the ecoregion. Population status is unknown, but probably rare. Some evidence suggests that mesic environments are preferred. Because snakes in this genus are specialized snail predators (Rossman and Myer 1990), the taxon may depend somewhat on the snails that are also listed as primary targets.
Habitat: Habitat use is poorly understood. Found in mountainous or hilly woodland and forest, valleys, upland meadows, and the edges of swamps and bogs. Hides under and in litter, understory vegetation, coarse woody debris, building foundations, and abandoned ant mounds. Generally associated with mesic situations and abundant ground cover (Baxter and Stone 1985, Biological and Conservation Database 2000b). Specialization for feeding on land snails (Rossman and Myer 1990) may require this taxon to frequent environments with high snail availability.
Conservation goal: An ecoregional endemic with moderate habitat and prey specialization; therefore *6-8 populations* are required for long-term persistence. Because data on population densities and home range sizes are lacking, patch size (364 ha - 500 ha) is set equal to that of a similar taxon, the smooth green snake. Patches should be separated by 6.5 km - 7.6 km, with $\geq$ 2 permanent streams between closest patch edges. Note that known dens/ hibernacula are very important, and should be encompassed by portfolio sites whenever possible, preferably with each patch in a different planning unit.

***Vertigo arthuri* (Dakota Vertigo)**
Status: G2 / S2 (SD)
Justification as target: Disjunct in Black Hills, reported elsewhere only in North Dakota (drift specimens), northern Minnesota, and two sites in Alberta (dead only). Restricted to rich, undisturbed forest sites. Frest reported collecting the species live at sixteen Black Hills sites.
Habitat: Wet to moist, undisturbed forest, pine or spruce communities, with diverse understory, deep litter, and shaded, north-facing slopes. Most commonly found on calcareous soils but also found on schist-derived soils. Usually found at sites with high mollusc species diversity.
Conservation goal: Viability is hard to assess. Although the species is reported elsewhere, it is very rare and may be extirpated from much of its former range. The species is likely to occur mostly within the ecoregion. A minimum of *6 viable populations* is the conservation goal, but conservation measures should be liberal. To ensure long-term survival of this species in the ecoregion, the following sites should be designated conservation sites: Mystic Site (Frest's site 155), Spearfish Canyon watershed (one colony at Bridal Veil Falls, likely to be more colonies in the watershed), Rattlesnake Canyon (Frest's site 14), Broad Gulch (Frest's site 94) and Middle Boxelder Creek (Frest' site 148).

***Vertigo paradoxa* (Mystery Vertigo)**
Status: G2G4 / S1 (SD)
Justification as target: Disjunct, relict population. Rare throughout its range, which includes northern Maine and Michigan and southern Canada east of the Great Lakes. Known to occur in only 4 colonies in the Black Hills.
Habitat: Generally restricted to rich, lowland wooded sites in the northern Black Hills. Most colonies found in spruce communities, but also in pine communities. Forest canopy is generally closed, heavy forest litter, and diverse understory. Most sites are at the base of north-facing slopes. Occurs on both limestone and schist derived soils.

Conservation goal: Viability is difficult to assess. This species occurs in other ecoregions. A minimum of *3 viable populations* is the conservation goal, but conservation measures should be liberal. Only four colonies are known within the ecoregion. All known colonies should be protected to ensure the survival of this species in the ecoregion: Reno Gulch (Frest site 64), Ditch Creek (Frest site 76), Jim Creek (Frest site 96, Frest describes site as "badly pastured *Pinus ponderosa* forest), and Ice Cave (Frest site 127).

Secondary Animal Targets

Global Name	Common Name	Global Code	Global Rank
Accipiter gentilis	Northern Goshawk	ABNKC12060	G5
Calcarius mccownii	Mccown's Longspur	ABPBXA6010	G5
Calcarius ornatus	Chestnut-collared	ABPBXA6040	G5
Clethrionomys gapperi	Black Hills Red-backed	AMAFF09027	G5T3
Cynomys ludovicianus	Black-tailed Prairie Dog	AMAFB06010	G4
Falco peregrinus anatum	American Peregrine	ABNKD06071	G4T3
Haliaeetus leucocephalus	Bald Eagle	ABNKC10010	G4
Junco hyemalis aikeni	White-winged Junco	ABPBXA5022	G5T4
Liochlorophis vernalis	Smooth Green Snake	ARADB47010	G5
Melanerpes lewis	Lewis's Woodpecker	ABNYF04010	G5
Picoides arcticus	Black-backed	ABNYF07090	G5
Picoides tridactylus	Three-toed Woodpecker	ABNYF07080	G5
Speyeria idalia	Regal Fritillary	IILEPJ6040	G3
Tamiasciurus hudsonicus	Black Hills Red Squirrel	BHANIM002	G5T2Q
Zapus hudsonius campestris	Bear Lodge Meadow	AMAFH01013	G5T3

***Accipiter gentilis* (Northern goshawk)**
Status: G5 / S2S3B, S4N (WY) S3B, S2N (SD). WGFD SSC4. USFS Region 2 and 4 Sensitive.
Justification as target: Taxon is essentially non-migratory, and is strongly associated with conifer forest. However, it is likely that the Black Hills population regularly exchanges a few individuals with adjacent population segments. Mid- to late-seral conifer stands are preferred for nesting, and such stands are relatively rare in the ecoregion.
Habitat: Nesting occurs in a wide variety of forest types (e.g., deciduous, coniferous, and mixed). In the western U.S., nests are recorded most frequently in conifers (e.g., *Pinus* spp., *Abies* spp., *Pseudotsuga menziesii*, *Thuja* spp., *Picea* spp., *Larix* spp.; Reynolds et al. 1982, Hayward and Escano 1989, Bright-Smith and Mannan 1994, Squires and Ruggiero 1996). However, nests are also known from stands dominated by *Populus tremuloides*, *Betula papyrifera*, and even *Salix* spp. (McGowan 1975, Swem and Adams 1992, Younk and Bechard 1994, Squires and Reynolds 1997). The taxon typically nests in mid- to late seral stands (Hayward and Escano 1989, Reynolds et al. 1982, Speiser and Bosakowski 1987, Squires and Ruggiero 1996) and generally selects larger over smaller stands (Bosakowski and Speiser 1994, Woodbridge and Detrich 1994). Nests are usually constructed in the largest trees of dense, mature stands with high canopy closure (60-95 percent) and sparse ground cover, near the bottom of moderate slopes, and near water (Bull and Hohmann 1994, Hargis et al. 1994, Reynolds et al 1982, Siders and Kennedy 1994, Squires and Ruggiero 1996, Younk and Bechard 1994). Breeding goshawks forage in both heavily forested and relatively open habitats (Younk and Bechard 1992, Beier and Drennan 1997, Squires and Reynolds 1997). Habitat requirements during the non-breeding season are poorly understood (Squires and Reynolds 1997). In general, goshawks winter at lower elevations and in landscapes with more open vegetation than during breeding season, although Widen (1989) found some preference for large tracts of mature forest during winter in Sweden.
Conservation goal: A widespread and mobile taxon that prefers breeding in mid- to late-seral conifer forest; therefore *3 populations* are required for long-term persistence. Because this taxon has such large area requirements relative to the amount of suitable habitat in the ecoregion, each patch should be about 86,750 ha and is intended to provide for only 50 breeding pairs. Although this may not be adequate for long-term persistence in the event of a large population decline, it is a more realistic goal for this ecoregion than the standard 100 breeding pairs per patch

(i.e., 173,500 ha/ patch). In this context, patch size is based on a median reported nest spacing of about 3.8 km (Squires and Reynolds 1997). Also, a practical separation distance is difficult to determine for such a mobile taxon; the minimum diameter of 1 circular patch is used here. The majority of one patch should be in the Bear Lodge, one foothills, and one non-foothills planning units.

Calcarius mccownii **(McCown's longspur)**
Status: G5 / S3B, SZN (WY) SUB, SZN (SD).
Justification as target: A regional endemic that breeds in only a small portion of the northern and central Great Plains; recent data suggest population declines. Strongly associated with dry and open grassland.
Habitat: Breeding occurs in sparse short-grass prairie, especially areas that have been heavily grazed or recently burned. Both nesting and foraging usually occur in patches of bare or nearly-bare ground. Occasionally found in freshly plowed fields and stubble fields (American Ornithologists Union 1983, With 1994a). Nests are usually placed in scrapes on the ground at the base of shrubs, grass clumps, or cacti, or beside cattle dung. Nests beside shrubs may be subject to heavy predation by ground squirrels (With 1994b).
Conservation goal: A regional endemic that breeds only in flat, dry grassland; therefore, *6 populations* are required for long-term persistence. Patch size (100 ha - 137 ha) is based on a median reported breeding territory of 1.0 ha (With 1994a). Patches should be separated by 3.4 km - 4.0 km, with $\geq$ 2 permanent streams between closest patch edges. Two patches should be located in each foothills planning unit.

Calcarius ornatus **(Chestnut-collared longspur)**
Status: G5 / S2B, SZN (WY) S4B, SZN (SD).
Justification as target: A regional endemic that breeds in only a small portion of the northern Great Plains; recent data suggest population declines. Strongly associated with open grassland.
Habitat: Breeds in rolling mixed-grass and shortgrass uplands, and, in drier regions, moist lowlands (DuBois 1935, Fairfield 1968, Owens and Myers 1973, Stewart 1975, Wiens and Dyer 1975, Kantrud and Kologiski 1982). Prefers open prairie and avoids excessively shrubby areas (Arnold and Higgins 1986); however, scattered shrubs and other low perches often are used for singing (Harris 1944, Fairfield 1968, Creighton 1974). Also avoids areas with dense litter accumulations (Renken 1983, Berkey et al. 1993, Anstey et al. 1995). Prefers native grassland to heavily-grazed pastures and hay meadows (Fairfield 1968, Owens and Myres 1973, Maher 1974, Stewart 1975, Johnsgard 1980, Faanes 1983, Anstey et al. 1995, Davis and Duncan 1995). Cultivated fields, fallow fields, and stubble may support a few individuals if vegetation structure is suitable (Fairfield 1968, Owens and Myres 1973, Stewart 1975, Anstey et al. 1995). In North Dakota, densities were higher in cropland than in the tall, dense vegetation in Conservation Reserve Program fields (Johnson and Igl 1995). Preferred vegetation height is <20-30 cm (Fairfield 1968). Within drier shortgrass habitats, chestnut-collared longspurs prefer wetter, taller, and more densely vegetated areas than McCown's longspurs and horned larks (DuBois 1937, Strong 1971, Creighton 1974, Kantrud and Kologiski 1982, Wershler et al. 1991). Low, moist areas and wet meadows are suitable habitat in arid and semi-arid regions (DuBois 1937, Giezentanner 1970, Stewart 1975). In contrast, in wetter mixed-grass prairie, the taxon avoids tall and dense vegetation in favor of sparser uplands (Renken 1983, Renken and Dinsmore 1987, Berkey et al. 1993, Johnson and Schwartz 1993, Anstey et al. 1995).
Conservation goal: A regional endemic that breeds only in open grassland; therefore, *6 populations* are required for long-term persistence. Patch size (190 ha - 261 ha) is based on a median reported breeding territory of 1.9 ha (Hill and Gould 1997). Patches should be separated by 4.7 km - 5.5 km, with $\geq$ 2 permanent streams between closest patch edges. Two patches should be located in each foothills planning unit.

Clethrionomys gapperi brevicaudus **(Black Hills red-backed vole)**
Status: G5T3 / S3 (WY) S5 (SD).
Justification as target: Subspecies is endemic to the ecoregion, and is completely isolated from adjacent populations (Pleistocene relict). It is likely relatively abundant within most forest types in the ecoregion. Some evidence suggests mesic, late-seral stands with abundant coarse-woody debris are required for long-term population persistence.
Habitat: At a macrohabitat scale, this taxon strongly prefers forest to woodland, grassland, and shrub-dominated environments. In the western U.S., coniferous forest is primary habitat, with infrequent occurrences in upland and riparian deciduous types. Cool, mesic conifer stands with abundant coarse woody debris and other near-ground

structures appear to be optimal habitat. Although found in conifer stands of various seral stages, including recently disturbed stands, it is generally accepted that *C. gapperi* prefers later seral stages (Pearson 1994, Beauvais 1997).
Conservation goal: An ecoregional endemic strongly associated with conifer forest, probably preferring mesic, late-seral stands; therefore *6-8 populations* are required for long term persistence. Patch size (76 ha - 105 ha) is based on a median recorded density of 1.3 breeding females/ ha (Merritt and Merritt 1978). Patches should be separated by 3.0 km - 4.0 km, with $\geq$ 2 permanent streams between closest patch edges. At least one patch should be located in each of the non-foothills planning units.

***Cynomys ludovicianus* (Black-tailed prairie dog)**
Status: G4 / S2 (WY) S4 (SD). USFWS Candidate.
Justification as target: Although peripheral to the ecoregion, this taxon is included because of its massive historical range decline and immediate threats from deliberate eradication efforts. Also, some evidence suggests that black-tailed prairie dog colonies are high-quality habitat for several other rare-but-peripheral vertebrates such as swift fox, mountain plover, burrowing owl, and ferruginous hawk (see Wuerthner 1997). Thus, by addressing the needs of this one taxon, the ecoregional plan can efficiently address the needs of several other taxa. The USFWS recently decided that listing the black-tailed prairie dog under the U.S. Endangered Species Act was warranted, but postponed a final decision.
Habitat: In general this taxon occupies dry, flat, and open grasslands with low and relatively sparse vegetation, including areas overgrazed by cattle. Rangewide, all major grassland types (short, mixed, and tall) are used (Osborn 1942, Bonham and Lerwick 1976, Coppock et al. 1983a, 1983b). Grass-dominated patches within sage-steppe are also occupied. Graminoids commonly found on colonies include *Agropyron* spp., *Stipa* spp., *Bouteloua gracilis*, and *Buchloe dactyloides* (O'Meilia et al. 1982, Coppock et al. 1983a, 1983b). Low and sparse vegetation is preferred; in landscapes with tall and dense vegetation, ungulate grazing or fire is usually required to prepare a site for colonization. After establishment, prairie dog foraging activities maintain low vegetation stature (Osborn 1942, Koford 1958). Fine to medium-textured soils such as silty clay loams, sandy clay loams, and loams are preferred (Merriam 1902, Thorp 1949, Koford 1958, Bonham and Lerwick 1976, Klatt and Hein 1978, Agnew et al. 1986), presumably because burrows tend to retain shape and strength better here than in coarser soils. However, sandy soils often support larger and coarser graminoids with lower forage quality; prairie dogs may avoid these forages and thus associated sandy areas. Shallow slopes of less than 10% are preferred (Koford 1958, Hillman et al. 1979), presumably in part because such areas drain well and are only slightly prone to flooding. Of 86 colonies studied by Hillman et al. (1979), the majority were on floodplain terraces (35% of all towns) and rolling hills (35%), followed by flats (23%) and badlands (7%). Similarly, Koford (1958) observed a preference for sites adjacent to the Little Missouri River in North Dakota. All researchers found that soils were primarily fine to medium textured, thus it appears that landform (e.g., terrace vs. hilltop) affects choice of colony location less than do slope and soil texture.
Conservation goal: A widespread and peripheral taxon that occurs in grassland and shrub-steppe environments; *3 populations* will likely ensure persistence of this plus other associated grassland taxa in the ecoregion. The Wyoming Game and Fish Department has estimated 2025 ha as the minimum size of a prairie dog complex that can support black-footed ferrets in the face of disease and other disturbances (B. Luce, Wyoming Game and Fish Department, personal communication). This was used as the minimum patch size here; note that a 2025 ha "complex" can include several occupied towns plus some unoccupied but appropriate intervening habitat. Because disease is an especially serious concern with prairie dogs, the separation distance (26 km, with $\geq$ 2 permanent streams between closest patch edges) was set at 5X the diameter of the minimum circular patch; note this is about 10X the average dispersal distance for individual black-tailed prairie dogs (Garrett and Franklin 1988). One patch should be located in each of the foothills planning units.

***Falco peregrinus anatum* (American peregrine falcon)**
Status: G4T3 / S1B, S2N (WY) SXB, SZN (SD). WGFD SSC3. South Dakota Endangered.
Justification as target: The continental population is recovering from a recent crash; taxon was recently de-listed from the U.S. Endangered Species Act. Although breeding has not recently occurred in the ecoregion, some suitable habitat is available to accommodate population expansion.
Habitat: Nests are placed on ledges on large cliffs, buttes, and canyon sides, especially those with commanding views of valleys supporting high densities of passerines, shorebirds, and/ or waterfowl (AOU 1983, Palmer 1988). Rock faces with at least some southern exposure are usually selected at the latitude of the Black Hills. Occasionally found nesting on very tall buildings in urban areas.

Conservation goal: This is a widespread and very mobile taxon that breeds on large cliffs and canyon sides. There are very few documented occurrences (both historical and recent) in the ecoregion; therefore, only *3 patches* of suitable habitat are specified. Furthermore, because suitable habitat is rare in the ecoregion and the taxon's area requirements are relatively large, each of the 3 patches should encompass as much habitat as is practical in the context of other fine-filter and coarse-filter targets. Although this may not ensure persistence in the ecoregion in the event of a large population decline, it is likely a more realistic goal than the standard 100 pairs/ patch (about 380,000 ha/ patch). Distribution of patches should be defined largely by the distribution of suitable canyon/ cliff habitat; each patch should encompass a different canyon or cliff set.

***Haliaeetus leucocephalus* (Bald eagle)**
Status: G4 / S2B, S3N (WY) S1B, S2N (SD). WGFD SSC2. South Dakota Endangered. USFWS Threatened.
Justification as target: The continental population is recovering from a recent crash; taxon will soon be de-listed from the U.S. Endangered Species Act. No breeding, and only small winter concentrations, occur in the ecoregion. Suitable habitat is available to accommodate larger and possibly more winter concentrations in the future.
Habitat: Rivers, lakes, and reservoirs with abundant fish and waterfowl are typical winter habitat; areas with reliable carrion and small mammals (especially lagomorphs) can also support wintering birds (Griffin et al. 1982). Communal winter roosts occur in coniferous or deciduous stands with large, accessible trees, and may be located several kilometers from foraging grounds.
Conservation goal: A widespread and very mobile taxon restricted to large water bodies and uplands with appropriate prey and carrion. There are very few documented occurrences (both historical and recent) in the ecoregion. Therefore, only *3 patches* of suitable habitat are specified. Because suitable habitat is so limited, and because the number of wintering birds is likely determined more by prey/ carrion density rather than area of suitable habitat, it is recommended that each of the 3 patches encompass as much habitat as is practical in the context of other fine-filter and coarse-filter targets. Separation distance (40 km) is a rough estimate based on taxon mobility. There are 2 winter concentrations known in the ecoregion; 1 patch should be centered on each site. Cottonwood forests on major streams could support future concentrations as population expansion continues; the third site should encompass such habitat.

***Junco hyemalis aikeni* (White-winged junco)**
Status: G5T4 / S2B, S3N (WY) S5B, S5N (SD).
Justification as target: This subspecies breeds only in the ecoregion and small portions of surrounding ecoregions. However, the population appears relatively secure and is rather general in habitat use.
Habitat: Probably best described as a habitat generalist; foothills and montane zones are likely preferred over open grassland.
Conservation goal: A regional endemic with rather general habitat use; therefore, *4 populations* are required for long-term persistence. Data on territory size and population density are lacking; therefore, patch size (90 ha - 124 ha) is based on information recorded for a closely related taxon, *J.phaeonotus* (median breeding territory 0.9 ha; Sullivan 1999). Patches should be separated by 3.2 km - 3.8 km, with $\geq$ 2 permanent streams between closest patch edges. One patch should be in the Bear Lodge planning unit; more than one should be in a foothills and non-foothills planning unit.

***Liochlorophis vernalis* (Smooth green snake)**
Status: G5 / S2 (WY) S4 (SD).
Justification as target: Although secure globally, the distribution of this taxon is very patchy in western North America. The ecoregion supports a disjunct population that may be affiliated more strongly with eastern rather than western races.
Habitat: Habitat use is not well-understood. Existing information suggests rather general habitat use in foothills and montane zones. Heavy ground cover, including vegetation, litter, rocks, and coarse-woody debris, may be an important habitat element (Baxter and Stone 1985).
Conservation goal: Ecoregional occurrences are disjunct from the main range, and the taxon is somewhat general in habitat use; therefore *3 populations* are required for long-term persistence. Because data on population densities and home range sizes are lacking, patch size (364 ha - 500 ha) is set to that used in the Wyoming Basins Ecoregional Plan (Beauvais 1999). This patch size was estimated from a general review of literature on snake life histories, and expert comments. Patches should be separated by 6.5 km - 7.6 km, with $\geq$ 2 permanent streams between closest

patch edges. One patch should be located in the Bear Lodge Mountain planning unit, one in a foothills planning unit and one in a non-foothills planning unit.

***Melanerpes lewis* (Lewis' woodpecker)**
Status: G5 / S2B, SZN (WY) S3B, S3N (SD). WGFD SSC3. USFS Region 2 Sensitive.
Justification as target: Although a relatively widespread breeder in western North America, recent data suggests a steady downward trend across most of its range. Appears to prefer burned conifer forest, which is relatively rare in the ecoregion.
Habitat: Breeds in open forest and woodland, often logged or burned, including oak, conifers (primarily *Pinus ponderosa*), riparian woodland and orchards, less commonly in pinyon-juniper (AOU 1983). Distribution closely matches that of open ponderosa pine forest in western North America; taxon is strongly associated with fire-maintained, late-seral ponderosa pine (Diem and Zeveloff 1980, Tobalske 1997, Saab and Dudley 1998). Some evidence suggests a preference for open ponderosa pine at higher elevations, and open riparian forests at lower elevations (Bock 1970, Tobalske 1997). Important habitat elements include an open tree canopy over a brushy understory, and abundant dead trees for nest cavities; dead and downed woody debris, perch sites, and abundant insects are also important (Linder and Anderson 1998, Saab and Dudley 1998). Habitat quality of burned stands varies with age, size, and intensity of the burn, density of remaining snags, and geographic region. Lewis' woodpeckers are generally considered a species of older burns rather than new ones, and tend to move into stands several years post-fire as dead trees begin to fall and brush develops. Depending on site characteristics, appropriate conditions may develop anywhere from 2 - 30 years post fire (Bock 1970, Block and Brennan 1987, Caton 1996, Linder and Anderson 1998, Saab and Dudley 1998). On partially-logged burns in Idaho, nest sites were characterized by the presence of large and soft snags, and an average of 62 snags >23cm DBH/ ha (Saab and Dudley 1998). Unlike other woodpeckers, this taxon is not well-adapted for excavating cavities in hard wood. Although Lewis' woodpeckers will occasionally excavate a cavity in soft and/ or rotting wood, they more frequently nest in natural cavities, or in those excavated and abandoned by other species (Harrison 1979, Tobalske 1997). Non-breeding habitat is variable; oak woodlands and nut and fruit orchards tend to be used more heavily in winter. An important habitat element in many wintering areas is the availability of storage sites for grains or mast, such as tree bark (e.g. bark of mature cottonwood trees), snags, or power poles with dessication cracks (Bock 1970, Tobalske 1997).
Conservation goal: A widespread and rather mobile taxon associated with conifer (especially burned) forest; therefore, *3 populations* are required for long-term persistence. Patch size (360 ha - 494 ha) is based on a median reported breeding territory of 3.6 ha (Tobalske 1997). Patches should be separated by 6.4 km - 7.5 km, with $\geq$ 2 permanent streams between closest patch edges. Patches should be distributed in the Bear Lodge, one foothills and one non-foothills planning units.

***Picoides arcticus* (Black-backed woodpecker)**
Status: G5 / S2 (WY) S3 (SD). WGFD SSC4. USFS Region 2 Sensitive.
Justification as target: Taxon is nonmigratory and strongly associated with conifer forest; there is likely only a small degree of connectivity between the Black Hills population and populations to the west and north. Tends to prefer recently burned conifer forest, which is relatively rare in the ecoregion.
Habitat: Breeds and winters in boreal and montane coniferous forests, especially areas with abundant snags (e.g., burns, bogs, blowdowns); less frequently in mixed forest and rarely in deciduous woodland (AOU 1983). Distribution closely tracks that of boreal and montane conifers; northern limits coincide with the limit of continuous conifer forest (Bock and Bock 1974). Strongly associated with recently burned conifers (Raphael and White 1984, Hutto 1995a, Hutto 1995b), including *Pinus* spp., *Picea* spp., *Abies* spp., *Larix* spp., and *Pseudotsuga menziesii* (Bock and Bock 1974, Yunick 1985, Goggans 1989, Villard and Beninger 1993, Villard 1994, Darveau et al. 1995). In Montana, the taxon was more abundant in montane pine and Douglas-fir than in subalpine spruce (Bock and Bock 1974). Hutto (1995b) found that the abundance of small trees in a burn was the best correlate of the taxon's abundance. In contrast to Lewis' woodpeckers, black-backed woodpeckers appear to be species of recent burns, likely due to their heavy reliance on wood-boring insects (Blackford 1955, Kingery 1977, Apfelbaum and Haney 1981, Raphael et al. 1987, Villard and Scheick 1996). Hutto (1995b) suggested that a mosaic of recently burned stands is source habitat (i.e., reproduction exceeds mortality) and unburned forest is sink habitat that supports individuals exported from more suitable sites. Nest holes are typically excavated in hard snags, partial snags, or live trees with dead heartwood; occasionally in stumps, fence posts, or utility poles. Nest cavity is usually 0.6 - 4.6 meters above ground in boles

averaging 21-23 cm DBH, often near water (Evans and Conner 1979, McClelland et al. 1979, Raphael and White 1984, Saab and Dudley 1998). Foraging is typically concentrated on ridges, and is focused equally on live and recently-dead trees averaging 31 cm DBH and 18 m in height with more than 40 percent of their needles intact (Bull et al. 1986). Snags and logs also used for foraging (Raphael and White 1984).
Conservation goal: A widespread taxon with a high-degree of isolation in the ecoregion and a preference for recently burned or otherwise disturbed conifer stands; therefore *4 populations* are required for long-term persistence. Data on territory size and population density are lacking; therefore, patch size (3334 m - 4567 m) is based on information from a closely related target taxon, *P. tridactylus*. Patches should be separated by 19.6 km - 22.9 km, with ≥ 2 permanent streams between closest patch edges. One patch should be located in the Bear Lodge planning unity; more than one patch should be in a foothills and a non-foothills planning unit.

***Picoides tridactylus* (Three-toed woodpecker)**
Status: G5 / S3 (WY) S2 (SD). USFS Region 2 and 4 Sensitive.
Justification as target: Taxon is nonmigratory and strongly associated with conifer forest; there is likely only a small degree of connectivity between the Black Hills population and populations to the west and north. Some preference for spruce forest; recently burned conifer forest (relatively rare in the ecoregion) is preferred in some areas.
Habitat: Breeds in coniferous forest (primarily *Picea* spp.), less frequently in mixed forest. Optimal habitat includes stands with 1 - 2 snags/ ha, with snags occurring in clumps, measuring 31 - 41 cm DBH and 6 - 12 m tall, and with bark still present (Spahr et al. 1991). Cavity nests are typically placed in conifer or aspen snags, occasionally in live trees, and infrequently in utility poles.
Conservation goal: A widespread taxon with a high-degree of isolation in the ecoregion and a preference for recently burned or otherwise disturbed conifer stands; therefore, *4 populations* are required for long-term persistence. Patch size (3334 ha - 4567 ha) is based on a reported density of 3 breeding pairs/ 100ha (Biological and Conservation Database 2000a). Patches should be separated by 19.6 km - 22.9 km, with ≥ 2 permanent streams between closest patch edges. One patch should be located in the Bear Lodge planning unit; and more than one should be located in a foothills and non-foothills planning unit.

***Speyeria idalia* (Regal Fritillary)**
Status: G3 / S3 (SD)
Justification as target: Extirpated from much of the former range in eastern United States. Peripheral to the ecoregion (Stanford and Opler 1993).
Habitat: Tallgrass and mixed grass prairie. Occurs over most of South Dakota in native prairie, but much less common in the extreme western portions of the state (Royer and Marrone 1992b).
Conservation goal: This species is peripheral to the ecoregion. *One viable occurrence* is the conservation goal, if a viable population can be found. A viable populations should produce over 1000 adults in an average year, but this number may be lower for *Speyeria idalia*, 100-200 pairs may be a viable population with good management. Population fluctuations for other butterfly species are often at an order of magnitude. A viable population should be based on a metapopulation, not demes (Schweitzer, pers. comm to D. Backlund).

***Tamiasciurus hudsonicus dakotensis* (Black Hills red squirrel)**
Status: G5T2Q / S3? (WY) S5 (SD)
Justification as target: Subspecies is endemic to the ecoregion, and is completely isolated from adjacent populations (Pleistocene relict). Morphologically, the taxon is uniquely adapted to the Black Hills environment (Lindsay 1987). The taxon appears to be relatively abundant and occurs in most conifer types in the ecoregion.
Habitat: This taxon is strongly associated with coniferous forest, especially those dominated by *Pinus contorta*, *Pseudotsuga menziesii*, *Abies* spp., and *Picea* spp. Ponderosa forests and woodlands are used occasionally, especially in the absence of Abert's squirrel (Ferner 1974). The subspecies *T. h. dakotensis* is specially adapted to feeding on ponderosa pine cones (Lindsay 1987). Although occasionally seen in deciduous forest and woodland, especially in the Black Hills region, these types are poor quality habitat (Kemp and Keith 1970).
Conservation goal: An ecoregional endemic that occurs only in coniferous forest; therefore, *6-8 populations* are required for long-term persistence. Patch size (77 ha - 106 ha) is based on a median recorded density of 2.6 individuals/ ha in western North America (Lane 1954, USDI Fish and Wildlife Service 1987). Because this taxon is rather mobile relative to its small patch size, the separation distance (5.0 km - 5.8 km, with ≥ 2 permanent streams

between closest patch edges) was increased to 5X the diameter of a minimum circular patch to insulate against disease dispersal; note this distance is over 10X the maximum recorded dispersal distance for individual red squirrels (Larsen and Boutin 1994). More than one patch should be located in the Bear Lodge Mountains planning unit and the four other planning units the species is found in.

***Zapus hudsonius campestris* (Bear Lodge meadow jumping mouse)**
Status: G5T3 / S2 (WY) S5 (SD).
Justification as target: Subspecies is considered endemic to the ecoregion and surrounding areas. However, the degree of population isolation is uncertain; the Black Hills population may be contiguous with subspecies to the east and south.
Habitat: Habitat use by this particular subspecies is not well studied; the below information is drawn from studies of a related subspecies, *Z. h. preblei*. This taxon is strongly associated with heavy vegetation on the margins of streams and in other wet areas (e.g., marshes, springs, seeps). Although riparian environments in prairie and foothills zones are thought to be optimal, recent surveys in southeastern Wyoming suggest dense populations also occur along montane streams (Beauvais 1998; Wyoming Natural Diversity database unpublished data). Meadow jumping mice in Wyoming and Colorado use the entire floodplain of streams to a distance of about 100m from the stream channel; however, most activity occurs in dense and tall vegetation immediately adjacent to flowing water (Compton and Hugie 1993, Beauvais 1998, Grant 1999, Taylor 1999, Pague and Grunau 2000). Heavy herbaceous cover is vital, and high densities of meadow jumping mice have been recorded in areas with at least some woody (e.g., cottonwood, willow) overstory. Dry upland types such as ponderosa pine, juniper woodland, short grass prairie, and dry or irrigated croplands are not suitable (Merrill et al. 1996), although recent studies indicate that jumping mice undertake nocturnal foraging forays into such environments (T. Shenk, Colorado Division of Wildlife, personal communication). Also, hibernation probably occurs in uplands immediately adjacent to riparian corridors. When inactive in winter, meadow jumping mice occupy underground burrows in banks or hills; in summer, they rest under logs or clumps of vegetation.
Conservation goal: A regional endemic specialized to riparian environments; therefore *6 populations* are required for long-term persistence. Recorded densities of *Z .hudsonius* vary widely, from about 7 individuals/ ha to 48 individuals/ ha (see Beauvais 2000); to be conservative, the patch size (500 m - 700 m of stream, buffered by 100m on either side) was based on the upper limit of the lower 1/3 of this range (i.e., 21 individuals/ ha). Observations of a closely related taxon, *Z. h. preblei*, suggest most activity occurs within 100m of a stream channel (T. Shenk, Colorado Division of Wildlife, personal communication; Pague and Grunau 2000). Therefore patches should be 200m wide and centered on permanent streams. Distributing patches by watershed will help de-couple populations from periodic floods as well as other disturbances. Patches should also be distributed by planning unit, with one patch in the Bear Lodge Mountains, one or more in each of the 2 foothills planning units and one or more in each of the non-foothills planning units.

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Appendix 4. Aquatic System Information for the Black Hills Ecoregion.

Each system type represents a different pattern of physical settings thought to contain a distinct set of biological communities and is therefore a distinct conservation target. Patterns in the six attributes and in the macrohabitat types were used to identify ecological system types. In addition, it was necessary to consider several other attributes in the system classification. The influence of upstream geology and topography on downstream hydrology was addressed. The hydrologic regime for systems was classified using gaging data results from Miller and Driscoll's (1993) report titled *Streamflow Characteristics for the Black Hills of South Dakota, through water year 1993* and by grouping subwatersheds with similar geologic and topographic characteristics. Systems were classified as stable, moderately stable, or unstable. Also, several streams in the southern portion of the ecoregion are influenced by hot springs, resulting in two distinct systems that are thermally influenced – Fall River and a group of intermittent tributaries that include Hot Brook.

Type	Size	Gradient	Hydrology	Geology	Examples and Springs
1	HW, creek and small river size	Low, moderate and high gradients	Intermittent streams only	Sandstones with interbedded clay and shales	[SD]Willow, Crooked Oak, Maloney, Stinking Water, Crow & Grummit Canyon Cr. [WY] Spring, Road, East, Left, Lake, Barlow, Sourdough, Bitter, Buck, Deer, Deep, Horse, Pine, Medicine, S Branch Grummit Canyon, Elkhorn Cr., Skull, Sand, East & West Plum Creek, Oil, & Little Oil Creek
2	HW, creek and small river size	Low, moderate, and high gradients	Intermittent, and unstable, perennial streams	Sandstones with interbedded clay and shales	[SD] Lower part of Hay Cr subwatershed [WY] Upper part of Hay Cr, Beaver, Arch, Inya Kara, Mason, Houston, Cabin, Oak, Miller, Lytle, Blacktail, & Lame Jones. [Springs] HWs of Inya Kara.
3	Large river size	Anastomosing, very low gradient	Perennial river	Sandstones with interbedded clay and shales	[WY] Belle Fourche River
4	Small river size	Low and moderate gradients	Stable, perennial river with thermal influences (temp>80 F)	Shale and siltstone, to sandstones with interbedded clay and shales	[SD] Fall River & Cascade Spring. Springs.
5	HW, creek & small river size	Low, moderate and high gradients	Intermittent, and perennial streams	Starting on granite across limestone, and shale and siltstone, to sandstones with interbedded clay and shales	[SD] Bear Butte, Cottle, Alkali, Pleasant Valley, Morris, Elk, Iron, Grizzly Bear, Spring, Little Squaw, Dry, Battle, Grace Coolidge & Lame Johnny, Boxelder, French, & Beaver Cr. Springs in Bear Butte, Elk, Spring, Battle, Grace Coolidge, & Boxelder subwatersheds and HWs of Alkali Cr and Cattle Cr.
6	HW, creek & small river size	Low, moderate and high gradients	Intermittent streams only	Starting on limestone across shale and siltstone, to sandstones with interbedded clay and shales	[SD] Dugout, Coon, Pass & Whoopup Cr. [WY] Lower part of Whoopup Cr.

7	HW, creek & small river size	Low, moderate and high gradients	Intermittent, and perennial streams	Granite and limestone, to shale and siltstone	[SD] Lower part of Redwater Cr., & Spearfish, Whitewood, Cold Spring, Potato, Beaver, Mill, Crow, Chicken, Spring, False Bottom, Polo, & Miller Cr. [WY] S. Redwater, Sundance, Red Canyon, Cold Spring, Sand & Redwater Cr. [Springs] Spearfish subwatershed & Sand, Crow and Cold Spring.
8	HW & creek size	Low, moderate and high gradients	Intermittent, and perennial streams with high salinity	Sandstones with interbedded clay and shales	[WY] Salt Creek
11	HW & creek size	Low, moderate and high gradients	Intermittent streams only	Sandstones with interbedded clay and shales	[SD & WY] Southern tribs to Cheyenne River
12	HW, creek & small river size	Low, moderate and high gradients	Intermittent, and stable, perennial streams	Limestone, to granite, to shale and siltstone, to sandstones with interbedded clays and shales	[SD] Rapid, Prairie, Castle, Rhoads Fork, & Slate Cr. Springs in HWs and lower section of Rapid watershed.
15	HW & creek size	Low and moderate gradients	Intermittent streams only	Shale and siltstone, to sandstones with interbedded clay and shales	[SD] Central eastern tribs including Murphy, Billover, & Dry Cr.
16	HW, creek & small river size	Low, moderate and high gradients	Intermittent, and unstable? perennial streams	Limestone, to shale and siltstone, to sandstones with interbedded clay and shales	[SD] Eastern tribs of Stockade Beaver, Little Bear Run, Pleasant Valley, Lightning, Hawkwright Cr., Cottonwood Springs, Hot Brook, and HWs of Fall River, including Carroll & Cold Brook. [WY] Stockade Beaver. Springs in HWs and lower section of Stockade Beaver, in Hot Brook & above Cold Brook reservoir

Appendix 5. Areas of Biodiversity Significance within the Black Hills Ecoregion.

In the Black Hills ecoregion, areas of biodiversity significance were delineated which represent the most important areas for biodiversity conservation, including the entire set of areas needed to conserve or restore the conservation targets. These sites were selected regardless of current management status. This portfolio of conservation sites will direct the activities of The Nature Conservancy in the Black Hills, as well as assist public management agencies in management practices.

An Aquatic Suitability Index (ASI) provided a preliminary draft set of ecoregional sites, representing the highest quality occurrences of each system type. Individual catchments within each watershed were analyzed, and the relative poorest quality areas within them were ruled out. A preliminary list of priority sites was then compiled by choosing areas with the greatest number of high quality reaches and the lowest number of poor quality reaches.

The terrestrial site selection process began with the identified occurrences of terrestrial ecological systems. The next step in the site selection process was to identify areas with viable or restorable examples of plant associations not already captured by the known system occurrences. Information came mainly from the BHCI database of element occurrences, in addition to a smaller set of occurrences stored in state Natural Heritage databases. The final step was to define areas that capture viable or restorable examples of species targets not already found within sites based on occurrences of terrestrial and aquatic systems and plant communities.

Several areas were selected as both terrestrial and aquatic based sites. These areas not only contained the best example of one of the aquatic system targets, but included terrestrial targets distributed throughout the site. However, in cases where terrestrial sites overlapped aquatic sites by only a small area, they were left as separate but overlapping sites. The two types of sites demand a different focus because strategies for conservation will differ greatly.

The following report details important information about each site, including a site description, size of the site, ownership information and targets found at each site.

Angostura Reservoir

Site Number: 38 **Site Type:** terrestrial **Total Size of Site:** 808.786 acres (1.265 sq. miles)

Site Description:

This site was chosen to include a single occurrence of Amblycheila cylindriformis. This tiger beetle is a regional endemic that occurs in scattered populations across its range, from western TX and eastern NM north to southwest SD. Unlike most tiger beetles, this species is flightless and nocturnal. In the Black Hills ecoregion, Amblychelia cylindriformis is restricted to a few sites in the southern foothills, always in undisturbed sandsage steppe habitat. This species is only known from 4 locations in the Black Hills - 2 at Angostura Reservoir and 2 at Cheyenne River Canyons. Two of the occurrences were captured in the Cheyenne River Canyons site (site 37). The planning team drew another small site around the more southern occurrence at Angostura Reservoir (site B, outside the ecoregion). A larger site at Angostura encompassing both occurrences of this tiger beetle was not created, for several reasons. Angostura Reservoir was created by the damming of the Cheyenne River, it is highly impacted by recreational uses, and it is not a high quality site for any other conservation targets. The target species is flightless, so doesn't need a large, connected site for movement, foraging or dispersal. Site B should be considered by the Northern Great Plains Steppe team in future planning iterations.

Angostura Dam is located on the Cheyenne River, 9 miles southeast of the town of Hot Springs in the southeastern Black Hills - the dam creates the Angostura Reservoir, one of three reservoirs in the Black Hills. The Angostura Recreation Area surrounds the reservoir and is managed by the Game, Fish and Parks Department in South Dakota. The park offers boating, camping, fishing and swimming. The Bureau of Reclamation built the dam between 1946-1949 for irrigation purposes, but has also been greatly used recreation. The dam created 5,000 surface acres of water - the deepest part is 75 feet, with an average depth of 29 feet. The reservoir has 36 miles of shoreline and lots of sandy beaches.

Site Threats:

recreational development, crested-wheatgrass conversion, cottage development, habitat fragmentation is high

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	3.164 (.39%)
Private	209.464 (25.9%)
State	143.229 (17.71%)
Water	16.474 (2.04%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Primary Animal Targets			
Amblycheila Cylindriformis	1	4	25%

Angostura Reservoir South

Site Number: B **Site Type:** terrestrial **Total Size of Site:** 1229.675 acres (1.921 sq. miles)

Site Description:

This site was chosen to include a single occurrence of Amblycheila cylindriformis. This tiger beetle is a regional endemic that occurs in scattered populations across its range, from western TX and eastern NM north to southwest SD. Unlike most tiger beetles, this species is flightless and nocturnal. In the Black Hills ecoregion, Amblychelia cylindriformis is restricted to a few sites in the southern foothills, always in undisturbed sandsage steppe habitat. This species is only known from 4 locations in the Black Hills - 2 at Angostura Reservoir and 2 at Cheyenne River Canyons. Two of the occurrences were captured in the Cheyenne River Canyons site (site 37). The planning team drew another small site around the more northern occurrence at Angostura Reservoir (site 38). A larger site at Angostura encompassing both occurrences of this tiger beetle was not created, for several reasons. Angostura Reservoir was created by the damming of the Cheyenne River, it is highly impacted by recreational uses, and it is not a high quality site for any other conservation targets. The target species is flightless, so doesn't need a large, connected site for movement, foraging or dispersal. Site B should be considered by the Northern Great Plains Steppe team in future planning iterations.

Site Threats:

high habitat fragmentation

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Primary Animal Targets			
Amblycheila Cylindriformis	1	4	25%

Bad Luck Cave

Site Number: 35 **Site Type:** terrestrial **Total Size of Site:** 6192.371 acres (9.675 sq. miles)

Site Description:

This site was chosen mainly for the protection of the Townsend's Big-eared Bat. It includes a cluster of springs for foraging habitat and the entrance to the cave. The site also contains an occurrence of Black Hills Montane Grassland, a rare community type in the ecoregion.

Site Threats:

habitat disturbance is low

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	6047.579 (97.66%)
Private	144.792 (2.34%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Plant Community Targets			
Black Hills Montane Grassland	1	18	6%
Undetermined Ponderosa Pine Forest And Woodland Plant Communities	1	9	11%
Primary Animal Targets			
Townsend's Big-eared Bat	1	7	14%

Bear Beaver Gulch

Site Number: 09 **Site Type:** terrestrial **Total Size of Site:** 9906.72 acres (15.48 sq. miles)

Site Description:

This site includes two Forest Service Botanical Areas, Bear/Beaver Gulch and Higgins (Level 2 Managed Areas). In addition, the site was drawn to include the area surrounding the Botanical Areas to encompass several A-ranked plant targets. Forest Service Botanical Areas are managed with emphasis on "conserving or enhancing areas of botanical interest and, where appropriate, developing and interpreting these areas for public education (US Forest Service 1997)." Timber harvest is minimal in these areas and livestock grazing is only allowed if it does not conflict with the values for which the botanical area was designated.

Site Threats:

roads causing habitat fragmentation, forestry causing habitat disturbance, fire suppression

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	7910.705 (79.85%)
Private	1999.585 (20.18%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Plant Community Targets			
Paper Birch / Hazel Forest	1	12	8%
Undetermined Ponderosa Pine Forest And Woodland Plant Communities	1	9	11%
Primary Plant Targets			
Dwarf Scouring Rush	1	6	17%
Ground Cedar	2	4	50%
Round-leaved Orchid	3	7	43%
Primary Animal Targets			
Black Hills Redbelly Snake	1	18	6%
Cooper's Rocky Mountainsnail	1	26	4%
Northern Flying Squirrel	1	4	25%
Tawny Crescent	1	16	6%
Secondary Plant Targets			
American Trailplant	1	16	6%
Bristly Clubmoss	1	3	33%
Long-stalked Sedge	1	10	10%
Marsh Muhly	1	4	25%
Northern Holly-fern	2	7	29%
Treelike Clubmoss	1	20	5%
Secondary Animal Targets			
Northern Goshawk	2	19	11%

Bear Butte Creek

Site Number: 12 **Site Type:** aquatic **Total Size of Site:** 16175.359 acres (25.272 sq. miles)

Site Description:

This site is an area of biodiversity significance in the Black Hills because of the aquatic system it represents. Aquatic Type #5 is a system composed of headwater creeks and small rivers with low-to-high gradient intermittent and perennial streams starting on granite across limestone. These streams can also start on shale and siltstone to sandstones with interbedded clay and shales. About 30 streams in the ecoregion are of this type. Bear Butte Creek was determined one of the highest quality creeks of this type through an aquatic suitability index and expert opinion.

There are two primary targets present at this site - the Ground Cedar and Black Hills Redbelly Snake. Several other secondary species target are also located in this site.

Site Threats:

sedimentation, med-high toxins/contaminants, possible trout, some moderation of water levels or changes in natural flow patterns

Ownership/Description of site:

	Acres (% of total site area)
Bureau of Land Management	444.078 (2.75%)
Forest Service	8398.617 (51.92%)
Private	7330.504 (45.32%)
Water	2.16 (.01%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Aquatic System Type Targets			
Aquatic Type #5	1	2	50%
Primary Plant Targets			
Ground Cedar	1	4	25%
Primary Animal Targets			
Black Hills Redbelly Snake	1	18	6%
Secondary Plant Targets			
Bristly Clubmoss	1	3	33%
Broad-lipped Twayblade	1	1	100%
Long-stalked Sedge	1	10	10%
Mountain Huckleberry	2	3	67%
Treelike Clubmoss	4	20	20%
Secondary Animal Targets			
Northern Goshawk	1	19	5%

Bear Lodge/Beaver Creek

Site Number: 02 **Site Type:** aquatic/terrestrial **Total Size of Site:** 79598.14 acres (124.375 sq. miles)

Site Description:

The Bear Lodge Mountains, or simply the Bear Lodge, are a small uplift superimpsed on the Black Hills uplift during the time of Teriary igneous activity in the northernwestern part of the Hills. The highest elevations in the Bear Lodge are at Warren Peaks near the southern edge of this feature (6650 ft). Although techincally part of the Black Hills range, the Bear Lodge are sometimes considered distinct from the "Black Hills proper" because the two are separated by the Red Valley in the vicinity of Sundance, WY.

Much of the Bear Lodge are managed by the Forest Service for a variety of purposes, but predominately with big game winter range emphasis and timber production. There are two Late Successional Landscapes in the Bear Lodge, Hay Creek and Miller Creek, and a 4400 acre area devoted to back-country non-motorized use.

The site began as two separate sites - one to represent the aquatic system type of Beaver Creek and one to capture several target species occurrences that were not captured by the aquatic site. The two sites were later combined into one terrestrial/aquatic site to capture the entire biodiversity that is unique to the Bear Lodge Mountain area. The aquatic system type represented by this site includes headwter creeks and small rivers with low, moderate or high gradient intermittent and unstable perennial streams occurring on sandstones with interbedded clay and shales. This aquatic system type was created by expert review and was not originally part of the aquatic classification. Experts felt that the aquatic system in the Bear Lodge was significantly different that other systems in the surrounding area.

The site also includes two terrestrial systems - the Pine Forest System and Upland Aspen System. A number of plant communities are present, as well as numerous primary and secondary species targets. This site is felt to encompass a wealth of biodiversity.

Site Threats:

subdivision around Warren Peak, nuclear site, heavily managed for pine by forest service, having problem with regeneration due to sod-forming non-native grasses, roads, some herbivory from grazing in riparian areas

Ownership/Description of site:	**Acres (% of total site area)**
Bureau of Land Management	180.326 (.23%)
Corps of Engineers	916.94 (1.15%)
Forest Service	44434.251 (55.82%)
Private	33024.05 (41.49%)
State	1042.572 (1.31%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Ecological System Targets			
Pine Forest System	1	1	100%
Upland Aspen System	1	3	33%
Aquatic System Type Targets			
Aquatic Type #2	1	3	33%
Plant Community Targets			
Aspen / Beaked Hazel Forest	1	5	20%
Aspen / Bracken Fern Forest	1	2	50%
Aspen / Shiny-leaf Spiraea Forest	2	3	67%
Black Hawthorne Shrubland	3	5	60%
Black Hills Montane Grassland	2	18	11%
Northern Great Plains Little Bluestem Prairie	1	9	11%
Paper Birch / Hazel Forest	1	12	8%
Undetermined Oak Plant Communities	1	1	100%
Undetermined Wetland Plant Communities	1	1	100%
Primary Plant Targets			
Foxtail Sedge	1	5	20%
Prairie Dunewort	2	3	67%
Round-leaved Orchid	2	7	29%

Primary Animal Targets			
Berry's Rocky Mountainsnail	2	4	50%
Black Hills Redbelly Snake	3	18	17%
Secondary Plant Targets			
American Trailplant	8	16	50%
Cottongrass Bulrush	10	11	91%
Marsh Muhly	1	4	25%
Treelike Clubmoss	9	20	45%
Woodland Horsetail	1	2	50%
Secondary Animal Targets			
Bear Lodge Meadow Jumping Mouse	3	6	50%
Dark-eyed White-winged Junco	4	7	57%
Smooth Green Snake	1	18	6%
Three-toed Woodpecker	1	7	14%

Bear Spring/Lemming Draw

Site Number: 33 **Site Type:** terrestrial **Total Size of Site:** 628.147 acres (0.982 sq. miles)

Site Description:

This site was chosen for the protection of the high ranking Black Hills Montane Grassland community occurrences. There is also an occurrence of the Tawny Crescent, a primary animal target.

Site Threats:

habitat fragmentation caused by land development and roads and subdivision in middle part of site, habitat disturbance caused by grazing, fire suppression, excessive herbivory caused by grazing

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	448.376 (71.38%)
Private	179.771 (28.62%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Plant Community Targets			
Black Hills Montane Grassland	2	18	11%
Undetermined Ponderosa Pine Forest And Woodland Plant Communities	1	9	11%
Primary Animal Targets			
Tawny Crescent	1	16	6%

Black Fox

Site Number: 22 **Site Type:** terrestrial **Total Size of Site:** 4519.899 acres (7.063 sq. miles)

Site Description:

Black Fox Late Successional Landscape is located in the central Black Hills and is managed by the Black Hills National Forest to emphasize the late successional forest structure (level 2 management). Timber harvesting is minimal. Prescribed fire is used where appropriate to obtain late successional conditions. Activities in this area may include hiking, hunting, livestock grazing and mineral development. Mesic coniferous forests and woodlands (including old growth), and high elevation riparian types are well-represented here. There is a large complex of riparian forest, shrubland and herbaceous types that is one of the best examples found during the 3-year Black Hills Community Inventory (Marriott et. al 1999). Black Fox was determined to be an exemplary site by the Black Hills Community Inventory (Marriott et al. 1999). This determination is based on the quality of community occurrences at the site. Exemplary sites serve as examples against which to compare other areas and stands.

The site also includes the Iron Creek watershed, included in the site boundaries because of the excellent examples of three of our ecological system targets - upland aspen, high elevation wetland and high elevation riparian. Iron Creek watershed also contains excellent examples of several community types.

Site Threats:

habitat fragmentation caused by land development and roads, habitat disturbance casued by recreation and forestry, fire suppression

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	4500.635 (99.57%)
Private	19.264 (.43%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Ecological System Targets			
High Elevation Riparian System	1	6	17%
High Elevation Wetland System	1	4	25%
Plant Community Targets			
Beaked Willow Scrub	1	10	10%
Black Hills Streamside Vegetation	1	7	14%
Nebraska Sedge Wet Meadow	1	12	8%
Ponderosa Pine / Bearberry Woodland	1	9	11%
Ponderosa Pine / Chokecherry Forest	2	6	33%
Ponderosa Pine / Little Bluestem Woodland	1	17	6%
Ponderosa Pine / Snowberry Forest	2	8	25%
Ponderosa Pine/ Common Juniper Woodland	2	11	18%
Undetermined Sphagnum Bog Community	1	1	100%
White Spruce / Twinflower Forest	1	9	11%
White Spruce Alluvial Black Hills Forest	1	12	8%
Primary Animal Targets			
Cooper's Rocky Mountainsnail	1	26	4%
Secondary Plant Targets			
Delicate Sedge	1	3	33%
Sweet-coltsfoot	2	2	100%
Secondary Animal Targets			
Bald Eagle	1	3	33%
Smooth Green Snake	1	18	6%
Three-toed Woodpecker	1	7	14%

Canyon City

Site Number: 25 **Site Type:** terrestrial **Total Size of Site:** 2938.981 acres (4.592 sq. miles)

Site Description:

This site is drawn primarily around the Upper Rapid Creek Late Successional Landscape (LSL), but is extended to the west site to include an occurrence of Catinella gelida. Canyon City LSL is located in the central Black Hills and is managed by the Black Hills National Forest to emphasize the late successional forest structure (level 2 management). Timber harvesting is minimal. Prescribed fire is used where appropriate to obtain late successional conditions. Activities in this area may include hiking, hunting, livestock grazing and mineral development. There is high diversity of plant community types present at this site - many of which are of good quality. Mesic coniferous forests and woodlands (including old growth), dry riparian types and high elevation riparian types are well-represented. The best example of water birch shrubland, a type that is relatively uncommon and restricted in the Black Hills, was found at this site. Several dry coniferous types occur here as well. Canyon City was determined to be an exemplary site by the Black Hills Community Inventory (Marriott et al. 1999). This determination is based on the quality of community occurrences at the site. Exemplary sites serve as examples against which to compare other areas and stands.

Site Threats:

fire suppression

Ownership/Description of site:

	Acres (% of total site area)
Forest Service	2924.972 (99.52%)
Private	14.009 (.48%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Ecological System Targets			
High Elevation Riparian System	1	6	17%
Plant Community Targets			
Black Hills Streamside Vegetation	1	7	14%
Nebraska Sedge Wet Meadow	1	12	8%
Paper Birch / Hazel Forest	1	12	8%
Ponderosa Pine / Bearberry Woodland	1	9	11%
Ponderosa Pine / Little Bluestem Woodland	1	17	6%
Ponderosa Pine / Mountain Ninebark Forest	1	6	17%
Ponderosa Pine Scree Slope	1	1	100%
Ponderosa Pine/ Common Juniper Woodland	1	11	9%
Sandbar Willow Shrubland	1	2	50%
Water Birch / Red-osier Dogwood Shrubland	1	3	33%
Western Snowberry Shrubland	1	6	17%
White Spruce / Twinflower Forest	1	9	11%
White Spruce Alluvial Black Hills Forest	1	12	8%
Primary Animal Targets			
Catinella Gelida	1	4	25%
Dakota Vertigo	1	6	17%
Secondary Plant Targets			
Musk-root	1	12	8%
Secondary Animal Targets			
Northern Goshawk	1	19	5%
Smooth Green Snake	1	18	6%

Castle Creek

Site Number: 21 **Site Type:** aquatic/terrestrial **Total Size of Site:** 1830.144 acres (2.861 sq. miles)

Site Description:

This site includes Castle Creek (but not its tributaries), McIntosh Fen and Deerfield Lake. Castle Creek was once a great example of montane grasslands, but is now degraded. Bog iron deposits and historic mining have degraded the reach of Castle Creek below the North Fork of Castle Creek.

Small pockets of willow shrublands are found at McIntosh Fen. This plant community type is rare and is found nowhere else in the Black Hills. The Forest Service manages this area as a Botanical Area, and is currently undergoing a restoration of the natural water regime in hopes of reinvigorating the native plant communities. McIntosh Fen was determined to be an exemplary site by the Black Hills Community Inventory (Marriott et al. 1999). This determination is based on the quality of community occurrences at the site. Exemplary sites serve as examples against which to compare other areas and stands.

Deerfield Lake contains the only remaining populations of lake chub in the Black Hills.

Site Threats:

habitat destruction caused by primary and secondary home development and agriculture, habitat fragmentation caused by development and roads, habitat disturbance caused by grazing and forestry, fire suppression, trout, herbivory

Ownership/Description of site:

	Acres (% of total site area)
Forest Service	900.418 (49.2%)
Private	606.266 (33.13%)
Water	323.46 (17.67%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Aquatic System Type Targets			
Aquatic Type #12	1	1	100%
Plant Community Targets			
Baltic Rush Wet Meadow	1	1	100%
Beaked Willow Scrub	1	10	10%
Black Hills Montane Grassland	3	18	17%
Nebraska Sedge Wet Meadow	1	12	8%
Sage Willow Fen	1	1	100%
White Spruce / Twinflower Forest	1	9	11%
Primary Plant Targets			
Autum Willow	1	1	100%
Primary Animal Targets			
Cooper's Rocky Mountainsnail	2	26	8%
Lake Chub	2	4	50%
Striate Disc	1	10	10%
Tawny Crescent	1	16	6%
Secondary Animal Targets			
Smooth Green Snake	3	18	17%

Cement Ridge/Sand Creek Headwaters

Site Number: 08 **Site Type:** terrestrial **Total Size of Site:** 1602.019 acres (2.503 sq. miles)

Site Description:

This site was identified because the high quality and diversity of community targets here. There are also many species targets in this site.

Site Threats:

mining, incompatible forestry, conversion of land, fire suppression, road development, habitat fragmentation, possible runoff from agriculture practices, sedimentation risks from mining and agriculture, toxic runoff from mining, grazing in riparian areas

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	1261.781 (78.76%)
Private	340.237 (21.24%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Plant Community Targets			
Aspen / Beaked Hazel Forest	1	5	20%
Aspen / Bracken Fern Forest	1	2	50%
Aspen / Shiny-leaf Spiraea Forest	1	3	33%
Beaked Willow Scrub	1	10	10%
Black Hawthorne Shrubland	1	5	20%
Black Hills Montane Grassland	1	18	6%
Nebraska Sedge Wet Meadow	1	12	8%
Northern Great Plains Cattail Marsh	1	4	25%
Paper Birch / Hazel Forest	1	12	8%
Primary Plant Targets			
Foxtail Sedge	2	5	40%
Ground Cedar	1	4	25%
Primary Animal Targets			
Finescale Dace	1	6	17%
Secondary Plant Targets			
Bristly Clubmoss	1	3	33%
Cottongrass Bulrush	1	11	9%
Mountain Huckleberry	1	3	33%
Woodland Horsetail	1	2	50%

Cheyenne River Canyons

Site Number: 37 **Site Type:** aquatic/terrestrial **Total Size of Site:** 103883.234 acres (162.321 sq. miles)

Site Description:

This site is located in Fall River County, south of Hot Springs, SD. The site is drawn to include thirteen adjacent canyons. Also included in this site is the unique warm spring community of Cascade Springs, one of only two in the Black Hills (the other one is Hot Springs and is commercially developed). The Nature Conservancy owns the 4061 acre Whitney Preserve within this site. Additionally, TNC has negotiated 12,215 acres of conservation easements within this site, including the 8072 acres currently owned by the Institute of Range and the American Mustang, a wild horse sanctuary.

Site Threats:

no information

Ownership/Description of site:

	Acres (% of total site area)
Bureau of Land Management	993.133 (.96%)
Corps of Engineers	439.86 (.42%)
Forest Service	16311.282 (15.7%)
Private	39641.08 (38.16%)
TNC Easement	9408.306 (9.06%)
TNC Preserve	4421.273 (4.26%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Ecological System Targets			
Ponderosa Pine Woodland System	1	5	20%
Prairie System	1	3	33%
Aquatic System Type Targets			
Aquatic Type #11	1	1	100%
Aquatic Type #16	1	1	100%
Aquatic Type #4	1	2	50%
Primary Plant Targets			
Southern Maidenhair-fern	1	1	100%
Stream Orchid	1	1	100%
Primary Animal Targets			
Amblycheila Cylindriformis	2	4	50%
Fringe-tailed Myotis	1	6	17%
Tawny Crescent	1	16	6%
Townsend's Big-eared Bat	1	7	14%
Secondary Plant Targets			
Beaked Spikerush	1	1	100%
Secund Bladderpod	2	2	100%
Silver-mounded Candleflower	1	1	100%
Tulip Gentain	1	1	100%
Secondary Animal Targets			
Black-tailed Prairie Dog	1	3	33%
Lewis' Woodpecker	1	2	50%

Cranberry Springs

Site Number: 06 **Site Type:** terrestrial **Total Size of Site:** 7171.69 acres (11.206 sq. miles)

Site Description:

This site is drawn primarily around the Sand Creek Late Successional Landscape (LSL), but is extented to the west to include some habitat for our plant targets. Sand Creek LSL is located in the northern Black Hills and is managed by the Black Hills National Forest to emphasize the late successional forest structure (level 2 management). Timber harvesting is minimal as much of this area is managed for old growth. Prescribed fire is used where appropriate to obtain late successional conditions. Activities in this area may include hiking, hunting, livestock grazing and mineral development. Mesic coniferous forests and woodlands (including old growth), dry riparian types and upland hardwoods are well-represented. Small occurrences of dry conifer types are present. Cranberry Springs was determined to be an exemplary site by the Black Hills Community Inventory (Marriott et al. 1999). This determination is based on the quality of community occurrences at the site. Exemplary sites serve as examples against which to compare other areas and stands.

Site Threats:

currently low threats due to status as a late successional landscape, fire suppression

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	7171.69 (100.%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Ecological System Targets			
Ponderosa Pine Forest System	1	3	33%
Upland Aspen System	1	3	33%
Plant Community Targets			
Aspen / Beaked Hazel Forest	3	5	60%
Paper Birch / Hazel Forest	2	12	17%
Ponderosa Pine / Bearberry Woodland	2	9	22%
Ponderosa Pine / Bur Oak Woodland	2	3	67%
Ponderosa Pine / Chokecherry Forest	2	6	33%
Ponderosa Pine / Little Bluestem Woodland	2	17	12%
Ponderosa Pine / Snowberry Forest	4	8	50%
Primary Plant Targets			
Dwarf Scouring Rush	1	6	17%
Secondary Plant Targets			
American Trailplant	1	16	6%
Musk-root	1	12	8%

Davenport Cave/Beaver Park

Site Number: 11 **Site Type:** terrestrial **Total Size of Site:** 13166.307 acres (20.572 sq. miles)

Site Description:

This site is drawn based on several management units of the Black Hills National Forest, most notably the Sturgis Experimental Watershed, the VA Hospital Watershed and a back-country non-motorized area known as Beaver Park. Also included in the site is Vanocker Creek, an area surveyed during the Black Hills Community Inventory (Marriott et. al. 1999) and recommended as a possible expemplary site in the Black Hills. Beaver Park area, surved by Dave Ode, SDGFP, is also recommended as a possible exemplary site. Beaver Park is a fairly remote, roadless area. The Sierra Club has recently won a challenge to a timber sale in the area.

Site Threats:

high habitat disturbance in the cave

Ownership/Description of site:

	Acres (% of total site area)
Bureau of Land Management	8.888 (.07%)
Forest Service	11926.793 (90.59%)
Private	1228.87 (9.33%)
State	1.756 (.01%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Plant Community Targets			
Bur Oak / Ironwood Forest	3	5	60%
Creeping Juniper / Little Bluestem Dwarf-shrubland	2	3	67%
Northern Great Plains Little Bluestem Prairie	1	9	11%
Paper Birch / Hazel Forest	1	12	8%
Ponderosa Pine / Bearberry Woodland	1	9	11%
Ponderosa Pine / Bur Oak Woodland	1	3	33%
Ponderosa Pine / Chokecherry Forest	1	6	17%
Ponderosa Pine / Little Bluestem Woodland	3	17	18%
Western Snowberry Shrubland	2	6	33%
Primary Animal Targets			
Endemic G3 Springtail Not Yet Tracked By SDHP	1	1	100%
Fringe-tailed Myotis	1	6	17%
Townsend's Big-eared Bat	1	7	14%
Secondary Plant Targets			
Bloodroot	5	5	100%
Long-stalked Sedge	1	10	10%
Treelike Clubmoss	3	20	15%
Secondary Animal Targets			
Northern Goshawk	1	19	5%
Smooth Green Snake	1	18	6%

Devils Tower/Missouri Buttes

Site Number: 01 **Site Type:** aquatic/terrestrial **Total Size of Site:** 6547.446 acres (10.232 sq. miles)

Site Description:

The 1347 acre, Devils Tower National Monument was designated the country's first National Monument in 1906 by President Teddy Roosevent. The main attraction is the unique Tertiary igneous intrusion which forms a tower-shaped structure, very much visible in the surrounding flat plains. The area surrounding the rock structure contains rich examples of Black Hills flora and fauna, although much is threatened today due to fire suppression and exotic invasion. The park also supports a prairie dog town, one of the few remaining in the Black Hills. Devils Tower was determined to be a possible exemplary site during the Black Hills Community Inventory (Marriott et al. 1999). This determination is based on the quality of community occurrences at the site (riparian types are in poor condition).

The site was drawn to also include the Missouri Buttes, the IPY Ranch owned by John Dorrance, Lake Ranch, JW Knuckles, and Driscol Ranch.

Note: this site boundary may need to be reevaluated to include aquatic type #1.

Site Threats:

generally low threats due to status as a national monument, some runoff in Belle Fourche from neighboring farms, some home development, artificially low stream flow in Belle Fourche due to irrigation

Ownership/Description of site:

	Acres (% of total site area)
National Park Service	1437.81 (21.96%)
Private	5042.991 (77.02%)
State	66.645 (1.02%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Ecological System Targets			
Ponderosa Pine Woodland System	1	5	20%
Prairie System	1	3	33%
Aquatic System Type Targets			
Aquatic Type #1	1	2	50%
Aquatic Type #3	1	1	100%
Plant Community Targets			
Ash - Elm / Wolfberry Forest	1	2	50%
Black Hills Granite/ Metamorphic Rock Outcrop	1	5	20%
Bur Oak / Chokecherry - Western Snowberry Woodland	1	1	100%
Cottonwood - Peach-leaf Willow Floodplain Woodland	1	1	100%
Ill-scented Sumac / Bluebunch Wheatgrass Shrub Pra	1	1	100%
Nebraska Sedge Wet Meadow	1	12	8%
Needle-and-thread - Blue Grama Mixedgrass Prairie	1	4	25%
Northern Great Plains Little Bluestem Prairie	1	9	11%
Ponderosa Pine / Bluebunch Wheatgrass Woodland	1	1	100%
Ponderosa Pine / Little Bluestem Woodland	1	17	6%
Ponderosa Pine / Oregon Grape Forest	1	1	100%
Ponderosa Pine / Sedge Woodland	1	6	17%
Ponderosa Pine / Western Wheatgrass Woodland	1	2	50%
Prairie Cordgrass - Sedge Wet Meadow	1	5	20%
Prairie Dog Town Grassland Complex	1	2	50%
Redbeds (siltstone) Rock Outcrop	1	2	50%
Silver Sagebrush / Western Wheatgrass Shrub Prairi	1	1	100%
Undetermined Sagebrush Plant Community	1	1	100%
Wheatgrass - Needle-and-thread Mixedgrass Prairie	1	3	33%
Secondary Animal Targets			
Bear Lodge Meadow Jumping Mouse	1	6	17%
Black-tailed Prairie Dog	1	3	33%

Dugout Gulch

Site Number: 05 **Site Type:** terrestrial **Total Size of Site:** 2154.178 acres (3.367 sq. miles)

Site Description:

This site includes the Dugout Gulch Forest Service Botanical Areas and surrounding area. Forest Service Botanical Areas are managed with emphasis on "conserving or enhancing areas of botanical interest and, where appropriate, developing and interpreting these areas for public education (US Forest Service 1997)." Timber harvest is minimal in these areas and livestock grazing is only allowed if it does not conflict with the values for which the botanical area was designated.

The Nature Conservancy has a good acquisition project potential in northern part of this site.

Site Threats:

portions within the special botanical area may be less threatened by resource extraction, but private inholdings are not protected and are vulnerable to logging, agriculture conservation and high recreational use, some risk of fragmentation in private inholdings due to second home development, invasive species, fire suppression, grazing still occurs within special botanical area in riparian areas occupied by rare plants

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	1774.212 (82.36%)
Private	379.965 (17.64%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Plant Community Targets			
Black Hawthorne Shrubland	1	5	20%
Bur Oak / Ironwood Forest	1	5	20%
Paper Birch / Hazel Forest	1	12	8%
Undetermined Ponderosa Pine Forest And Woodland Plant Communities	1	9	11%
Primary Plant Targets			
Foxtail Sedge	1	5	20%
Secondary Plant Targets			
Northern Holly-fern	2	7	29%
Pellaea gastonyi (no common name)	1	5	20%
Secondary Animal Targets			
Large Yellow Ladies Slipper	1	1	100%

Eagle Cliffs

Site Number: 15 **Site Type:** terrestrial **Total Size of Site:** 183.228 acres (0.286 sq. miles)

Site Description:

This site was identified because of the rare Black Hills Montane Grassland occurrence.

Site Threats:

land development, habitat fragmentation caused by roads and development, habitat disturbance caused by agriculture and grazing, fire suppression

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	102.364 (55.87%)
Private	80.864 (44.13%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Plant Community Targets			
Black Hills Montane Grassland	1	18	6%
Undetermined Ponderosa Pine Forest Plant Communities	1	4	25%
White Spruce / Twinflower Forest	1	9	11%

Elk/Pilger Mountains

Site Number: 36 **Site Type:** terrestrial **Total Size of Site:** 66087.804 acres (103.265 sq. miles)

Site Description:

This site was originally drawn around an occurrence of the Ponderosa Pine Woodland system with a surrounding grassland buffer. There is a diverse mix of the more xerophytic plant community types of the Black Hills found here. Dry coniferous forests and woodlands (including old growth), and dry mesic mixedgrass prairies are common here. Elk Mountain was determined to be an exemplary site by the Black Hills Community Inventory (Marriott et al. 1999). This determination is based on the quality of community occurrences at the site. Exemplary sites serve as examples against which to compare other areas and stands.

The site was later expanded to include Pilger Mountains to the south. This area is a proposed Wilderness Area.

Site Threats:

no information

Ownership/Description of site:

	Acres (% of total site area)
Bureau of Land Management	4121.69 (6.24%)
Elk Foundation	94.953 (.14%)
Forest Service	44797.031 (67.78%)
Private	15423.86 (23.34%)
State	1632.323 (2.47%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Ecological System Targets			
Ponderosa Pine Woodland System	1	5	20%
Plant Community Targets			
Needle-and-thread - Blue Grama Mixedgrass Prairie	2	4	50%
Northern Great Plains Little Bluestem Prairie	2	9	22%
Ponderosa Pine / Little Bluestem Woodland	3	17	18%
Ponderosa Pine / Mountain Ninebark Forest	2	6	33%
Ponderosa Pine / Rocky Mountain Juniper Woodland	2	4	50%
Ponderosa Pine / Sedge Woodland	2	6	33%
Ponderosa Pine/ Common Juniper Woodland	2	11	18%
Undetermined Grassland Plant Communities	1	2	50%
Western Wheatgrass - Blue Grama - Threadleaf Sedge	1	1	100%
Secondary Animal Targets			
Dark-eyed White-winged Junco	1	7	14%

Fall River

Site Number: 39 **Site Type:** aquatic **Total Size of Site:** 4125.659 acres (6.448 sq. miles)

Site Description:

This site is drawn to incude the watershed of the Fall River and the springs to the northwest which feed the river. It should be noted that Fall River is dammed in the town of Hot Springs to make the recreational attraction of Evan's Plunge.

Site Threats:

nutrient loading, sedimentation

Ownership/Description of site:	**Acres (% of total site area)**
Corps of Engineers	410.901 (9.96%)
Forest Service	475.994 (11.54%)
Private	3204.679 (77.68%)
Water	34.085 (.83%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Aquatic System Type Targets			
Aquatic Type #4	1	2	50%
Aquatic Type #9	1	1	100%
Primary Animal Targets			
Townsend's Big-eared Bat	1	7	14%

French Creek

Site Number: 31 **Site Type:** aquatic **Total Size of Site:** 88839.923 acres (138.813 sq. miles)

Site Description:

This site is an area of biodiversity significance in the Black Hills because of the aquatic system it represents. Aquatic Type #5 is a system composed of headwater creeks and small rivers with low-to-moderate-to-high gradient intermittent and perennial streams starting on granite across limestone, shale and siltsone. It can also occur on sandstones with imbedded clay and shale. About 30 streams in the ecoregion are of this type. French Creek was determined one of the highest quality creeks of this type through an aquatic suitability index and expert opinion. There are also a number of other targets at this site, including 5 occurrences of the Black Hills Redbelly Snake.

Site Threats:

habitat fragmentation caused by development and roads, habitat disturbance caused by forestry, fire suppression, nutrient loading, sedimentation, trout

Ownership/Description of site:

	Acres (% of total site area)
Forest Service	36131.125 (40.67%)
Private	26570.262 (29.91%)
State	19374.949 (21.81%)
TNC Easement	66.704 (.08%)
Water	146.125 (.16%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Aquatic System Type Targets			
Aquatic Type #16	1	2	50%
Aquatic Type #5	1	2	50%
Plant Community Targets			
Ash - Elm / Wolfberry Forest	1	2	50%
Beaked Willow Scrub	1	10	10%
Canadian Reedgrass Wet Meadow	1	6	17%
Nebraska Sedge Wet Meadow	1	12	8%
Northern Great Plains Cattail Marsh	2	4	50%
Prairie Cordgrass - Sedge Wet Meadow	1	5	20%
Sandbar Willow Shrubland	1	2	50%
Undetermined Grassland Plant Communities	1	2	50%
Undetermined Ponderosa Pine Woodland Plant Communities	1	4	25%
Water Birch / Red-osier Dogwood Shrubland	1	3	33%
Western Great Plains Streamside Vegetation	1	2	50%
Primary Plant Targets			
Blunt-broom Sedge	1	1	100%
Primary Animal Targets			
American Dipper	1	14	7%
Black Hills Redbelly Snake	5	18	28%
Dakota Vertigo	1	6	17%
Lake Chub	1	4	25%
Tawny Crescent	1	16	6%
Secondary Animal Targets			
Black-backed Woodpecker	1	2	50%
Northern Goshawk	6	19	32%
Smooth Green Snake	2	18	11%

Gillette Canyon

Site Number: 34 **Site Type:** terrestrial **Total Size of Site:** 2555.561 acres (3.992 sq. miles)

Site Description:

This site includes parts of Ditch Creek and Whoopup Creek, several caves with vertigos and bats, and an Oreohelix population.

Site Threats:

habitat fragmentation caused by development and roads, habitat disturbance caused by forestry and grazing, fire suppression

Ownership/Description of site:	Acres (% of total site area)
Forest Service	2299.375 (89.98%)
Private	256.186 (10.02%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Plant Community Targets			
Black Hills Montane Grassland	2	18	11%
Undetermined Ponderosa Pine Forest And Woodland Plant Communities	1	9	11%
Primary Animal Targets			
Cooper's Rocky Mountainsnail	1	26	4%
Fringe-tailed Myotis	1	6	17%
Mystery Vertigo	1	2	50%
Pahasapa Mountainsnail	1	10	10%
Striate Disc	2	10	20%
Tawny Crescent	1	16	6%

Hell Canyon/Jewel Cave

Site Number: 32 **Site Type:** aquatic/terrestrial **Total Size of Site:** 4373.652 acres (6.834 sq. miles)

Site Description:

The site boundary was drawn to include Hell Canyon and Jewel Cave national Monument; it extends to the south and east to include an unnamed spring, Upper and Lower Stockade Spring and Locktrough Spring.

Jewel Cave National Monument was established in 1908 and is recognized as the third longest cave system in the world. The cave contains many rare cave formations, including delicate hydromagnesite balloons, helictites, and scintillites.

Hell Canyon and Jewel Cave were determined to be a possible exemplary site during the Black Hills Community Inventory (Marriott et al. 1999). This determination is based on the quality of community occurrences at the site. Hell Canyon is managed by the Forest Service with big game winter range emphasis.

Site Threats:

habitat fragmentation caused by development and roads, habiat disturbance caused by forestry, fire suppression

Ownership/Description of site:

	Acres (% of total site area)
Forest Service	3142.259 (71.85%)
National Park Service	1227.014 (28.05%)
Private	4.379 (.1%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Ecological System Targets			
Ponderosa Pine Forest System	1	3	33%
Ponderosa Pine Woodland System	1	5	20%
Aquatic System Type Targets			
Aquatic Type #6	1	1	100%
Plant Community Targets			
Aspen/chokecherry Forest	1	1	100%
Box Elder / Chokecherry Forest	1	2	50%
Northern Great Plains Little Bluestem Prairie	1	9	11%
Ponderosa Pine / Bearberry Woodland	2	9	22%
Ponderosa Pine / Little Bluestem Woodland	4	17	24%
Ponderosa Pine / Mountain Ninebark Forest	2	6	33%
Ponderosa Pine / Rocky Mountain Juniper Woodland	2	4	50%
Ponderosa Pine / Sedge Woodland	1	6	17%
Ponderosa Pine / Snowberry Forest	1	8	13%
Ponderosa Pine/ Common Juniper Woodland	3	11	27%
Western Snowberry Shrubland	1	6	17%
Wheatgrass - Needle-and-thread Mixedgrass Prairie	1	3	33%
Primary Animal Targets			
Fringe-tailed Myotis	1	6	17%
Tawny Crescent	2	16	13%
Townsend's Big-eared Bat	1	7	14%
Secondary Plant Targets			
Musk-root	1	12	8%
Secondary Animal Targets			
Black-backed Woodpecker	1	2	50%

High Granite Region

Site Number: 29 **Site Type:** terrestrial **Total Size of Site:** 22935.032 acres (35.836 sq. miles)

Site Description:

This site includes the areas around Black Elk Wilderness, Mt. Rushmore National Monument and The Needles area of Custer State Park - locally known as the High Granite Region. The site was drawn along Mt. Rushmore and Forest Road 244 on the northern boundary, Palmer Creek and Highway 87 on the west, Norbeck Wildlife Preserve, Custer State Park and the Iron Creek watershed on the south, and Highway 16A and Mt. Rushmore on the east. Although some of these boundaries are artificial ones, and some people may argue that the granite region continues further beyond the ecoregional site boundary - the site boundaries are meant to separate the High Granite Region from the ecologically distinctive lower and dryer areas surrounding the site. The High Granite Region, when compared to the surrounding granite area, has noteably more spruce, more rare plants, and higher/wetter areas.

The site includes the Black Elk Wilderness - a 9,831 acre area located in the Norbeck Wildlife Preserve of the Black Hills National Forest in the east-central portion of the Hills - just south of Mt. Rushmore and north of Custer State Park. It was designated Wilderness in 1980. The highest point in the Black Hills, South Dakota, and east of the Rocky Mountains is located in the Wilderness - Harney Peak (7242 ft). This Wilderness contains the Upper Pine Creek Research Natural Area, designated in 1932. The Wilderness area is managed to protect and perpetuate the "wilderness" character and values. The area is open to non-motorized human uses, but visitors to the wilderness will be limited by the Forest Service if the human use "impedes the free play of natural forces or interferes with natural successions in the ecosystem (US Forest Service 1997)". The Black Elk Wilderness and Upper Pine Creek RNA were determined to be an exemplary site by the Black Hills Community Inventory (Marriott et al. 1999). This determination is based on the quality of community occurrences at the site. Exemplary sites serve as examples against which to compare other areas and stands. Lost Cabin Creek is within the Black Elk Wilderness - this watershed contains examples of two our our ecological system targets - high elevation riparian and high elevation wetland. Several high quality community occurrences are also found here.

The site also includes Mt. Rushmore National Memorial - most famously known for the granite sculpture carved between 1927 and 1941 by Gutzon Borglum to memorialize the birth, growth, preservation and development of the United States. However, there are high quality natural examples of Black Hills flora, fauna, and geological formations surrounding the monument itself and protected by the Park Service designation.

Site Threats:

fire suppression

Ownership/Description of site:

	Acres (% of total site area)
Forest Service	18753.643 (81.77%)
National Park Service	1235.473 (5.39%)
Private	259.946 (1.13%)
State	2672.601 (11.65%)
Water	13.372 (.06%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Ecological System Targets			
High Elevation Riparian System	2	6	33%
High Elevation Wetland System	2	4	50%
Ponderosa Pine Forest System	1	3	33%
Upland Aspen System	1	3	33%
Plant Community Targets			
Beaked Willow Scrub	1	10	10%
Black Hills Granite/ Metamorphic Rock Outcrop	2	5	40%
Black Hills Streamside Vegetation	3	7	43%
Box Elder / Chokecherry Forest	1	2	50%
Bur Oak / Ironwood Forest	1	5	20%
Canadian Reedgrass Wet Meadow	3	6	50%
Nebraska Sedge Wet Meadow	2	12	17%
Paper Birch / Hazel Forest	1	12	8%
Ponderosa Pine / Bearberry Woodland	2	9	22%
Ponderosa Pine / Little Bluestem Woodland	1	17	6%

Ponderosa Pine / Mountain Ninebark Forest	1	6	17%
Ponderosa Pine / Rough-leaf Ricegrass Woodland	2	2	100%
Ponderosa Pine / Snowberry Forest	1	8	13%
Ponderosa Pine/ Common Juniper Woodland	2	11	18%
Undetermined Ponderosa Pine Forest Plant Communities	2	4	50%
White Spruce / Twinflower Forest	3	9	33%
White Spruce Alluvial Black Hills Forest	6	12	50%
Primary Plant Targets			
Great-spurred Violet	8	8	100%
Prairie Dunewort	1	3	33%
Round-leaved Orchid	1	7	14%
Spinulose Shield Fern	1	1	100%
Primary Animal Targets			
Black Hills Redbelly Snake	1	18	6%
Secondary Plant Targets			
Delicate Sedge	1	3	33%
Elegant Sedge	1	1	100%
Limber Pine	1	1	100%
Long-stalked Sedge	1	10	10%
Maidenhair Spleenwort	5	5	100%
Musk-root	5	12	42%
Secondary Animal Targets			
Northern Goshawk	3	19	16%
Smooth Green Snake	1	18	6%
Three-toed Woodpecker	1	7	14%
Wide-Ranging Animal Targets			
Black Bear	1	1	100%

Inyan Kara Mountain

Site Number: 17 **Site Type:** aquatic/terrestrial **Total Size of Site:** 6554.266 acres (10.241 sq. miles)

Site Description:

Inyan Kara Mountain is managed by the Forest Service for "protection of unusual scenic, heritage, historical, cultural, geological, botanical, zoological, paleontological, spiritual and other special characteristics (US Forest Service 1997)." The only way to visit this site is with permission of the surrounding landowners. There is minimal management by the Forest Service.

Inyan Kara was selected as an ecoregional portfolio site because of the aquatic system type found here. Black Hills aquatic system type 2 is composed of headwater streams of creek and small river size; has low, moderate, or high gradient creeks or small rivers; intermittent and unstable, perennial streams on sandstones with interbedded clay and shales. Streams in South Dakota include the lower part of Hay Cr. and in Wyoming include: upper part of Hay, Beaver, Arch, Inyan Kara, Mason, Houston, Cabin, Oak, Miller, Lytle, Blacktail, and Lame Jones Cr. Springs are present in headwaters of Inyan Kara Cr. This site was one of several that had excellent examples of aquatic system type 2. Without much knowledge of these aquatic systems, this site was chosen over others because of the potential terrestrial diversity that would be protected here as well. Not much is known about Inyan Kara Mountain, because of the inaccessiblity of this Forest Service land.

Site Threats:

already protected by USFS and isolation, very low threats

Ownership/Description of site:

	Acres (% of total site area)
Forest Service	1226.427 (18.71%)
Private	5032.107 (76.78%)
State	295.732 (4.51%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Aquatic System Type Targets			
Aquatic Type #2	1	3	33%
Plant Community Targets			
Undetermined Ponderosa Pine Forest And Woodland Plant Communities	1	9	11%

Little Spearfish Creek

Site Number: 14 **Site Type:** aquatic **Total Size of Site:** 17587.094 acres (27.479 sq. miles)

Site Description:

Recreational use is high along Little Spearfish Creek This site includes a diversity of high ranking riparian and wet meadow types. Litte Spearfish Creek was determined to be a possible exemplary site during the Black Hills Community Inventory (Marriott et al. 1999). This determination is based on the quality of community occurrences at the site.

Site Threats:

habitat fragmentation caused by development and roads, medium threat from recreational use, fire suppression

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	16890.768 (96.04%)
Private	696.326 (3.96%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Ecological System Targets			
High Elevation Riparian System	1	6	17%
Aquatic System Type Targets			
Aquatic Type #7	1	3	33%
Plant Community Targets			
Beaked Willow Scrub	1	10	10%
Black Hills Streamside Vegetation	1	7	14%
Nebraska Sedge Wet Meadow	1	12	8%
Paper Birch / Hazel Forest	1	12	8%
White Spruce / Twinflower Forest	1	9	11%
White Spruce Alluvial Black Hills Forest	1	12	8%
Primary Animal Targets			
Catinella Gelida	1	4	25%
Cooper's Rocky Mountainsnail	4	26	15%
Northern Flying Squirrel	1	4	25%
Tawny Crescent	3	16	19%
Secondary Animal Targets			
Northern Goshawk	2	19	11%
Smooth Green Snake	1	18	6%

Northern Hills Spring Creek

Site Number: 04 **Site Type:** aquatic/terrestrial **Total Size of Site:** 76609.83 acres (119.704 sq. miles)

Site Description:

This site was included for both the aquatic system present and the diversity of terrestrial targets.

Site Threats:

habitat conversion caused by development and agriculture, habitat fragmentation caused by development/roads and agriculture, fire suppression

Ownership/Description of site:

	Acres (% of total site area)
Bureau of Land Management	485.077 (.63%)
Forest Service	8814.312 (11.51%)
Private	64295.737 (83.93%)
State	2559.593 (3.34%)
TNC Easement	446.295 (.58%)
Water	8.816 (.01%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Aquatic System Type Targets			
Aquatic Type #2	1	3	33%
Aquatic Type #7	1	3	33%
Plant Community Targets			
Great Plains Cattail - Bulrush Marsh	1	1	100%
Northern Great Plains Little Bluestem Prairie	2	9	22%
Northern Plains Big Bluestem Prairie	1	1	100%
Prairie Cordgrass - Sedge Wet Meadow	1	5	20%
Primary Plant Targets			
Dwarf Scouring Rush	2	6	33%
Round-leaved Orchid	1	7	14%
Primary Animal Targets			
Black Hills Redbelly Snake	1	18	6%
Finescale Dace	5	6	83%
Tawny Crescent	2	16	13%
Secondary Plant Targets			
American Trailplant	4	16	25%
Northern Holly-fern	1	7	14%
Pellaea gastonyi (no common name)	3	5	60%
Treelike Clubmoss	3	20	15%
Variegated Scouring Rush	1	1	100%
Secondary Animal Targets			
Bald Eagle	1	3	33%
Dark-eyed White-winged Junco	1	7	14%

Oak Shale Savanna

Site Number: A1&2 **Site Type:** terrestrial **Total Size of Site:** 106173.927 acres (sq. miles)

Site Description:

Although the majority of these sites occur outside the ecoregion, these sites are drawn around a very unique, very rare, but under researched oak shale savanna community that is often considered part of the Black Hills proper. The completed plan for the Northern Great Plains Steppe did not address this area - and the Black Hills planning team wants to make sure that this very rare type is conserved.

Site Threats:

mining for bentonite, habitat fragmentation from mining/conversion to agriculture, roads, fire suppression, sedimenation and toxic contamination from mining, altered salinity from mining, change in topography from mining

Ownership/Description of site:

	Acres (% of total site area)
Bureau of Land Management	32.184 (.03%)
Bureau of Land Management	408.347 (.57%)
Private	2513.945 (1.97%)
Private	38596.591 (53.77%)
State	230.397 (.18%)
Water	74.95 (.1%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Plant Community Targets			
Bur Oak / Sedge Woodland	2	2	100%
Undefined Bur Oak/needle-and-thread Grass Or Western Wheatgrass Type	2	2	100%

Rapid Creek

Site Number: 26 **Site Type:** terrestrial **Total Size of Site:** 5515.163 acres (8.619 sq. miles)

Site Description:

This site is an area of biodiversity significance in the Black Hills because of the aquatic system it represents. Aquatic Type #12 is a system composed of creek and small river headwaters with low, moderate to high gradient intermittent, stable and perennial streams starting on limestone, granite, shale and siltstones to sandtones with interbedded clays and shales. About 10 streams in the ecoregion are of this type. Rapid Creek was determined one of the highest quality creeks of this type through an aquatic suitability index and expert opinion. There are also many unexplored caves in this site which could harbor terrestrial targets.

Site Threats:

no information

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	4816.011 (87.32%)
Private	699.148 (12.68%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Ecological System Targets			
Moist Caves	1	1	100%
Plant Community Targets			
Ponderosa Pine / Sedge Woodland	1	6	17%
Water Birch / Red-osier Dogwood Shrubland	1	3	33%
Primary Animal Targets			
American Dipper	2	14	14%
Lake Chub	1	4	25%
Northern Flying Squirrel	1	4	25%
Tawny Crescent	1	16	6%
Townsend's Big-eared Bat	1	7	14%
Secondary Plant Targets			
Musk-root	1	12	8%
Secondary Animal Targets			
Smooth Green Snake	1	18	6%

Reno Gulch

Site Number: 28 **Site Type:** terrestrial **Total Size of Site:** 239.773 acres (0.375 sq. miles)

Site Description:

This site was included for the diversity and quality of community types here. The site includes north facing slope of Reno Gulch.

Site Threats:

no information

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	182.758 (76.22%)
Private	57.015 (23.78%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Plant Community Targets			
Beaked Willow Scrub	1	10	10%
Nebraska Sedge Wet Meadow	1	12	8%
Western Snowberry Shrubland	1	6	17%
Primary Animal Targets			
Catinella Gelida	1	4	25%
Mystery Vertigo	1	2	50%
Striate Disc	2	10	20%

Reuter Canyon

Site Number: 03 **Site Type:** terrestrial **Total Size of Site:** 647.145 acres (1.011 sq. miles)

Site Description:

This site was included because it contains the best known occurrences of Oreohelix strigosa berryii.

Site Threats:

active timber sale in this area, heavily used campground, known as local party area, snowmobiling, habitat fragmentation from roads and forestry, fire suppression, nutrient loading and sedimentation caused by runoff from agriculture practices, possible concern for change in natural flow patterns from agriculture practices

Ownership/Description of site:	Acres (% of total site area)
Forest Service	462.04 (71.4%)
Private	185.105 (28.6%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Plant Community Targets			
Undetermined Ponderosa Pine Forest And Woodland Plant Communities	1	9	11%
Primary Animal Targets			
Berry's Rocky Mountainsnail	2	4	50%
Secondary Animal Targets			
Bear Lodge Meadow Jumping Mouse	1	6	17%

Reynolds Prairie

Site Number: 23 **Site Type:** terrestrial **Total Size of Site:** 4469.447 acres (6.983 sq. miles)

Site Description:

This site was identified because of the rare Black Hills Montane Grassland occurrence here. The southern half of this area is in public ownership and is of higher quality than the northern half. The northern half is in private ownership and is highly degraded due to cultivation. Both areas were included in the site boundary and may need to be refined during site conservation planning.

Site Threats:

habitat destruction caused by development and agriculture, habitat fragmentation from development/roads/agriculture, grazing, fire suppression

Ownership/Description of site:	Acres (% of total site area)
Forest Service	1749.714 (39.15%)
Private	2719.024 (60.84%)
Water	0.709 (.02%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Plant Community Targets			
Black Hills Montane Grassland	2	18	11%
Undetermined Ponderosa Pine Woodland Plant Communities	1	4	25%
Primary Animal Targets			
Black Hills Redbelly Snake	1	18	6%
Secondary Animal Targets			
Smooth Green Snake	1	18	6%

Salt Creek

Site Number: 19 **Site Type:** aquatic **Total Size of Site:** 29741.906 acres (46.472 sq. miles)

Site Description:

This aquatic site was drawn around the only example of the highly saline aquatic community.

Site Threats:

probably some modification of water levels or change in flow patterns

Ownership/Description of site:	**Acres (% of total site area)**
Bureau of Land Management	306.013 (1.03%)
Private	25446.052 (85.56%)
State	3573.372 (12.01%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Aquatic System Type Targets			
Aquatic Type #8	1	1	100%

Samelius Snake Site

Site Number: 27 **Site Type:** terrestrial **Total Size of Site:** 370.084 acres (0.578 sq. miles)

Site Description:

This site was drawn to encompass a hibernaculum of 300-400 Black Hills Redbelly Snakes.

Site Threats:

no information

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	364.162 (98.4%)
Private	5.922 (1.6%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Primary Animal Targets			
Black Hills Redbelly Snake	1	18	6%

Sand Creek Botanical Area

Site Number: 07 **Site Type:** terrestrial **Total Size of Site:** 1396.686 acres (2.182 sq. miles)

Site Description:

This site is composed of the Sand Creek Forest Service Botanical Area only. Forest Service Botanical Areas are managed with emphasis on "conserving or enhancing areas of botanical interest and, where appropriate, developing and interpreting these areas for public education (US Forest Service 1997)." Timber harvest is minimal in these areas and livestock grazing is only allowed if it does not conflict with the values for which the botanical area was designated.

This site may later be combined with the Cranberry Springs Late Successional Landscape site and the Upper Sand Creek Headwaters site.

Site Threats:

is a designated special botanical area on BHNF, threats from

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	1396.687 (100.%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Plant Community Targets			
Paper Birch / Hazel Forest	1	12	8%
Undetermined Ponderosa Pine Forest And Woodland Plant Communities	1	9	11%
Primary Plant Targets			
Dwarf Scouring Rush	1	6	17%
Foxtail Sedge	1	5	20%
Secondary Plant Targets			
Musk-root	1	12	8%
Northern Holly-fern	1	7	14%
Secondary Animal Targets			
Bear Lodge Meadow Jumping Mouse	1	6	17%

Skull Creek

Site Number: 18 **Site Type:** aquatic **Total Size of Site:** 52250.868 acres (81.64 sq. miles)

Site Description:

This site is an area of biodiversity significance in the Black Hills because of the aquatic system it represents. Aquatic Type #1 is a system composed of headwater creeks and small rivers with low-to-moderate-to-high gradient intermittent streams starting on sandstones with interbedded clay and shales. About 30 streams in the ecoregion are of this type. Skull Creek was determined one of the highest quality creeks of this type through an aquatic suitability index.

Site Threats:

no information

Ownership/Description of site:

	Acres (% of total site area)
Bureau of Land Management	944.756 (1.81%)
Private	36200.438 (69.28%)
State	2719.898 (5.21%)

Targets at Site:

	Number THIS Site	Number ALL Sites	Percent THIS Site
Aquatic System Type Targets			
Aquatic Type #1	1	2	50%

Slate Prairie

Site Number: 24 **Site Type:** terrestrial **Total Size of Site:** 1533.284 acres (2.396 sq. miles)

Site Description:

This site was identified because it contains two occurrences of the rare community Black Hills Montane Grassland. This site has many mixed uses and not much else is known about the biotic composition of the area.

Site Threats:

habitat conversion caused by development and agriculture, habitat fragmentation caused by development/roads and agriculture, grazing, fire suppression

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	582.339 (37.98%)
Private	950.945 (62.02%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Plant Community Targets			
Black Hills Montane Grassland	2	18	11%
Undetermined Ponderosa Pine Woodland Plant Communities	1	4	25%
Western Wheatgrass - Green Needlegrass Mixedgrass	1	2	50%

Spearfish Canyon

Site Number: 13 **Site Type:** terrestrial **Total Size of Site:** 10605.853 acres (16.571 sq. miles)

Site Description:

This 10,703 acre area is managed by the Forest Service as a scenic byway. It is a 20-mile drive that offers spectacular scenery of the narrow canyon and Sprearfish Creek. The Forest Service manages the landscapes adjacent to the road so that they appear natural. The Spearfish Canyon Foundation, operating as the Friends of Spearfish Canyon, is a non-profit land trust with the mission of promoting "natural and cultural history, appreciation of the environment, and responsible environmentally-sound multiple use and enjoyment of natural resources". Most of the land they aquire along Spearfish Canyon is gifted to the Forest Service.

Site Threats:

habitat conversion caused by development and agriculture, habitat fragmentation caused by development/roads and agriculture, habitat disturbance caused by recreational use, fire suppression

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	10385.095 (97.92%)
Private	219.332 (2.07%)
Water	1.426 (.01%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Ecological System Targets			
High Elevation Riparian System	1	6	17%
Plant Community Targets			
Beaked Willow Scrub	2	10	20%
Nebraska Sedge Wet Meadow	1	12	8%
Paper Birch / Hazel Forest	1	12	8%
Peach-leaf Willow Woodland	1	1	100%
Ponderosa Pine Limestone Cliff	1	2	50%
Undetermined Ponderosa Pine Forest Plant Communities	1	4	25%
White Spruce / Twinflower Forest	1	9	11%
White Spruce Alluvial Black Hills Forest	2	12	17%
Primary Plant Targets			
Dwarf Scouring Rush	1	6	17%
Primary Animal Targets			
American Dipper	10	14	71%
Black Hills Redbelly Snake	2	18	11%
Catinella Gelida	1	4	25%
Cooper's Rocky Mountainsnail	16	26	62%
Dakota Vertigo	1	6	17%
Pahasapa Mountainsnail	7	10	70%
Striate Disc	5	10	50%
Tawny Crescent	2	16	13%
Secondary Plant Targets			
American Trailplant	1	16	6%
Delicate Sedge	1	3	33%
Green Spleenwort	2	2	100%
Long-stalked Sedge	5	10	50%
Marsh Muhly	1	4	25%
Musk-root	2	12	17%
Northern Holly-fern	1	7	14%
Secondary Animal Targets			
Three-toed Woodpecker	4	7	57%

Stockade Beaver Creek

Site Number: 20 **Site Type:** aquatic **Total Size of Site:** 80452.27 acres (125.706 sq. miles)

Site Description:

This sight was originally drawn around the watershed of Stockade Beaver Creek through the aquatic classification process. The site was expanded by the planning team to capture the watershed to the south, which is a recharge area for Stockade Beaver. The site was also expanded slightly to the west to capture two occurrences of Dakota Vertigo (primary animal target). The western boundary of the site stays within the watershed divide when possible, but makes two small diversions for the Dakota Vertigo occurrences.

Site Threats:

habitat conversion and disturbance caused by development/agriculture/and forestry, habitat disturbance caused by grazing, fire suppression

Ownership/Description of site:

	Acres (% of total site area)
Bureau of Land Management	7852.352 (9.76%)
Forest Service	34322.557 (42.66%)
Private	31698.07 (39.4%)
State	6579.291 (8.18%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Aquatic System Type Targets			
Aquatic Type #16	1	2	50%
Plant Community Targets			
Black Hills Montane Grassland	2	18	11%
Mountain Mahogany / Side-oats Grama Shrubland	1	2	50%
Rocky Mountain Juniper / Little-seed Ricegrass Woo	1	1	100%
Undetermined Ponderosa Pine Woodland Plant Communities	1	4	25%
Primary Animal Targets			
Cooper's Rocky Mountainsnail	1	26	4%
Dakota Vertigo	3	6	50%
Fringe-tailed Myotis	1	6	17%
Pahasapa Mountainsnail	2	10	20%
Secondary Animal Targets			
Lewis' Woodpecker	1	2	50%
Northern Goshawk	3	19	16%
Smooth Green Snake	4	18	22%

Upper Grace Coolidge Creek

Site Number: 30 **Site Type:** terrestrial **Total Size of Site:** 488.659 acres (0.764 sq. miles)

Site Description:

Upper Grace Coolidge Creek is located southeast of Custer, SD. The site was drawn around a portion of the creek, and includes the surrounding riparian area. Plant communities surveyed here during the Black Hills Community Inventory (Marriott et al. 1999) were of high quality. These community types include high elevation riparian and wet meadow types, as well as mesic coniferous forests and woodlands. This site is only a short distance from the Black Elk Wilderness. Upper Grace Coolidge Creek was determined to be an exemplary site by the Black Hills Community Inventory (Marriott et al. 1999). This determination is based on the quality of community occurrences at the site. Exemplary sites serve as examples against which to compare other areas and stands.

Site Threats:

fire suppression, nutrient loading

Ownership/Description of site:	Acres (% of total site area)
State	488.659 (100.%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Ecological System Targets			
High Elevation Wetland System	1	4	25%
Plant Community Targets			
Beaked Willow Scrub	1	10	10%
Black Hills Streamside Vegetation	1	7	14%
Canadian Reedgrass Wet Meadow	2	6	33%
Nebraska Sedge Wet Meadow	1	12	8%
Northern Great Plains Cattail Marsh	1	4	25%
Prairie Cordgrass - Sedge Wet Meadow	1	5	20%
Undetermined Ponderosa Pine Forest And Woodland Plant Communities	1	9	11%
White Spruce Alluvial Black Hills Forest	1	12	8%

Upper Sand Creek

Site Number: 16 **Site Type:** aquatic **Total Size of Site:** 31184.785 acres (48.727 sq. miles)

Site Description:

This site is an area of biodiversity significance in the Black Hills because of the aquatic system it represents. Aquatic Type #7 is a system composed of headwater creeks and small rivers with low-to-moderate-to-high gradient intermittent and perennial streams starting on granite and limestone and moving to shale and siltstones. About 30 streams in the ecoregion are of this type. Upper Sand Creek was determined one of the highest quality creeks of this type through an aquatic suitability index.

Site Threats:

habitat destruction caused by mining, habitat fragmentation caused by land development and roads, habitat disturbance caused by forestry, fire suppression, watershed impacted from mining

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	27591.656 (88.48%)
Private	3593.129 (11.52%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Aquatic System Type Targets			
Aquatic Type #7	1	3	33%
Plant Community Targets			
Black Hills Granite/ Metamorphic Rock Outcrop	1	5	20%
Primary Animal Targets			
Black Hills Redbelly Snake	1	18	6%
Secondary Plant Targets			
Marsh Muhly	1	4	25%
Pellaea gastonyi (no common name)	1	5	20%
Secondary Animal Targets			
Dark-eyed White-winged Junco	1	7	14%
Smooth Green Snake	1	18	6%

Whitewood Cave

Site Number: 10 **Site Type:** terrestrial **Total Size of Site:** 6474.244 acres (10.116 sq. miles)

Site Description:

This site drawn primarily for townsend's bat habitat. The site was drawn to include part of the creek for foraging habitat.

Site Threats:

very high habitat disturbance in cave

Ownership/Description of site:	**Acres (% of total site area)**
Forest Service	1410.997 (21.79%)
Private	4971.981 (76.8%)
State	91.266 (1.41%)

Targets at Site:	**Number THIS Site**	**Number ALL Sites**	**Percent THIS Site**
Primary Animal Targets			
American Dipper	1	14	7%
Fringe-tailed Myotis	1	6	17%
Townsend's Big-eared Bat	1	7	14%
Secondary Plant Targets			
American Trailplant	1	16	6%
Long-stalked Sedge	1	10	10%

Wind Cave/Custer

Site Number: 40 **Site Type:** terrestrial **Total Size of Site:** 59723.471 acres (93.318 sq. miles)

Site Description:

This site includes the prairie habitat of Wind Cave National Park, Custer State Park, and some surrounding private land tracts. Wind Cave National Park was created in 1903 by Teddy Roosevelt - the seventh national park in the country and the first one created to protect a cave. Game management is a large part of Wind Cave's activities - the park manages bison and elk. Prescribed fire management is also used at Wind Cave. Exotic plants are locally common at scattered locations, but the overall condition of the vegetation in the park is high (Marriott et al. 1999). Wind Cave was determined to be an exemplary site by the Black Hills Community Inventory (Marriott et al. 1999). This determination is based on the quality of community occurrences at the site. Exemplary sites serve as examples against which to compare other areas and stands.

Custer State Park is a highly popular tourist destination in the Black Hills. The spectacular Needles formations can be seen from the park. The park also is great for wildlife viewing - there is active management of bison, elk, and pronghorn antelope.

Site Threats:

habitat fragmentaiton due to development and roads, habitat disturbance due to forestry, fire suppression

Ownership/Description of site:

	Acres (% of total site area)
Bureau of Land Management	39.155 (.07%)
Forest Service	1171.133 (1.96%)
National Park Service	27713.303 (46.4%)
Private	15577.626 (26.08%)
State	15157.04 (25.38%)
Water	5.579 (.01%)

Targets at Site:	Number THIS Site	Number ALL Sites	Percent THIS Site
Ecological System Targets			
Ponderosa Pine Woodland System	1	5	20%
Prairie System	1	3	33%
Plant Community Targets			
Black Hills Granite/ Metamorphic Rock Outcrop	1	5	20%
Chokecherry Shrubland	1	1	100%
Cottonwood / Wolfberry Floodplain Woodland	1	1	100%
Creeping Juniper / Little Bluestem Dwarf-shrubland	1	3	33%
Creeping Spikerush Wet Meadow	1	1	100%
Mountain Mahogany / Side-oats Grama Shrubland	1	2	50%
Needle-and-thread - Blue Grama Mixedgrass Prairie	1	4	25%
Northern Great Plains Little Bluestem Prairie	1	9	11%
Ponderosa Pine / Chokecherry Forest	1	6	17%
Ponderosa Pine / Little Bluestem Woodland	1	17	6%
Ponderosa Pine / Sedge Woodland	1	6	17%
Ponderosa Pine / Western Wheatgrass Woodland	1	2	50%
Ponderosa Pine Limestone Cliff	1	2	50%
Ponderosa Pine/ Common Juniper Woodland	1	11	9%
Prairie Cordgrass - Sedge Wet Meadow	1	5	20%
Prairie Dog Town Grassland Complex	1	2	50%
Redbeds (siltstone) Rock Outcrop	1	2	50%
Western Great Plains Streamside Vegetation	1	2	50%
Western Snowberry Shrubland	1	6	17%
Western Wheatgrass - Green Needlegrass Mixedgrass	1	2	50%
Wheatgrass - Needle-and-thread Mixedgrass Prairie	1	3	33%
Primary Animal Targets			
Northern Flying Squirrel	1	4	25%

Secondary Animal Targets			
Bald Eagle	1	3	33%
Black-tailed Prairie Dog	1	3	33%
Regal Fritillary	1	1	100%
Wide-Ranging Animal Targets			
Mountain Lion	1	1	100%

Appendix 6. Target Occurrences and Analysis of Conservation Goals.

In ecoregional planning, conservation goals for targets are set with the hope of ensuring long-term viability, and maintaining genetic and ecological variation. The numeric goal for each target should consider the number and distribution of occurrences needed to conserve the element within the Black Hills. Goals reflect an understanding of a host of ecological variables, including: life history characteristics, threats to occurrences, key ecological processes and disturbance regimes (The Nature Conservancy 1997, Groves et. al. 2000a). Regional and range-wide conservation is a concern. Goals and sites are chosen to protect the full range of biodiversity across the ecoregion. Targets endemic to the ecoregion receive greater emphasis than those that occur in many regions. Thus, the goals for the Black Hills are informed by the conservation work in other ecoregions within the range of each target.

This appendix lists, by site, the number of occurrences included in the ecoregional portfolio for each conservation target. When available, viability ranks are also included. Stratification goals are also listed and analyzed. An "X" in the column Cannot Meet indicates that the goal could not have been met with documented occurrences (number of known occurrence is indicated in parentheses). Communities are summarized by the system in which they occur. Species information follows.

Ponderosa Pine Forest System

SUMMARY INFORMATION	Conservation Goal	#Captured in Sites	Percent of Goal	Cannot Meet
Ponderosa Pine / Bearberry Woodland (CEGL000844)	3	9	300%	
Ponderosa Pine / Chokecherry Forest (CEGL000192)	3	6	200%	
Ponderosa Pine / Mountain Ninebark Forest (CEGL000190)	3	6	200%	
Ponderosa Pine / Snowberry Forest (CEGL000203)	3	8	267%	
Ponderosa Pine/Common Juniper Woodland (CEGL000859)	3	11	367%	

DETAIL INFORMATION

Ponderosa Pine / Bearberry Woodland (CEGL000844)		Rank	Count
Northern Central Core	Black Fox (22)	B	1
Northern Limestone Plateau	Davenport Cave/Beaver Park (11)	BC	1
Northwestern Foothills	Cranberry Springs (6)	B	2
Southern Central Core	Canyon City (25)	B	1
	High Granite Region (29)	AB	2
Southern Limestone Plateau	Hell Canyon/Jewel Cave (32)	B	2
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIC		9
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIC		**300%**

Ponderosa Pine / Chokecherry Forest (CEGL000192)		**Rank**	**Count**
Eastern Foothills	Wind Cave/Custer (40)	A	1
Northern Central Core	Black Fox (22)	B	1
	Black Fox (22)	BC	1
Northern Limestone Plateau	Davenport Cave/Beaver Park (11)	BC	1
Northwestern Foothills	Cranberry Springs (6)	B	2
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		6
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**200%**

Ponderosa Pine / Mountain Ninebark Forest (CEGL000190)		**Rank**	**Count**
Southern Central Core	Canyon City (25)	B	1
	High Granite Region (29)	B	1
Southern Limestone Plateau	Hell Canyon/Jewel Cave (32)	B	2
Southwestern Foothills	Elk/Pilger Mountains (36)	B	1
	Elk/Pilger Mountains (36)	BC	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		6
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**200%**

Ponderosa Pine / Snowberry Forest (CEGL000203)		**Rank**	**Count**
Northern Central Core	Black Fox (22)	B	1
	Black Fox (22)	BC	1
Northern Limestone Plateau	Cranberry Springs (6)	B	1
Northwestern Foothills	Cranberry Springs (6)	B	1
	Cranberry Springs (6)	BC	2
Southern Central Core	High Granite Region (29)	AB	1
Southwestern Foothills	Hell Canyon/Jewel Cave (32)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		8
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**267%**

Ponderosa Pine/Common Juniper Woodland (CEGL000859)		**Rank**	**Count**
Eastern Foothills	Wind Cave/Custer (40)	AB	1
Northern Central Core	Black Fox (22)	B	1
	Black Fox (22)	BC	1
	Canyon City (25)	AB	1
Southern Central Core	High Granite Region (29)	AB	1
	High Granite Region (29)	B	1
Southern Limestone Plateau	Hell Canyon/Jewel Cave (32)	B	2
Southwestern Foothills	Elk/Pilger Mountains (36)	AB	1
	Elk/Pilger Mountains (36)	B	1
	Hell Canyon/Jewel Cave (32)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		11
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**367%**

Ponderosa Pine Woodland System

SUMMARY INFORMATION	Conservation Goal	#Captured in Sites	Percent of Goal	Cannot Meet
Ponderosa Pine / Bluebunch Wheatgrass Woodland (CEGL000865)	2	1	50%	X (1)
Ponderosa Pine / Chokecherry Forest (CEGL000192)	3	6	200%	
Ponderosa Pine / Little Bluestem Woodland (CEGL000201)	3	17	567%	
Ponderosa Pine / Rocky Mountain Juniper Woodland (CEGL000861)	3	4	133%	
Ponderosa Pine / Sedge Woodland (CEGL000849)	3	6	200%	
Ponderosa Pine / Western Wheatgrass Woodland (CEGL000188)	3	2	67%	X (2)

DETAIL INFORMATION

Ponderosa Pine / Bluebunch Wheatgrass Woodland (CEGL000865)		Rank	Count
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**2**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**50%**

Ponderosa Pine / Chokecherry Forest (CEGL000192)		Rank	Count
Eastern Foothills	Wind Cave/Custer (40)	A	1
Northern Central Core	Black Fox (22)	B	1
	Black Fox (22)	BC	1
Northern Limestone Plateau	Davenport Cave/Beaver Park (11)	BC	1
Northwestern Foothills	Cranberry Springs (6)	B	2
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		6
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**200%**

Ponderosa Pine / Little Bluestem Woodland (CEGL000201)		Rank	Count
Eastern Foothills	Davenport Cave/Beaver Park (11)		1
	Davenport Cave/Beaver Park (11)	B	2
	Wind Cave/Custer (40)	A	1
Northern Central Core	Black Fox (22)	C	1
	Canyon City (25)	BC	1
Northwestern Foothills	Cranberry Springs (6)	B	2
	Devils Tower/Missouri Buttes (1)	AB	1
Southern Central Core	High Granite Region (29)	B	1
Southern Limestone Plateau	Hell Canyon/Jewel Cave (32)	B	4
Southwestern Foothills	Elk/Pilger Mountains (36)	B	3
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		17
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**567%**

Ponderosa Pine / Rocky Mountain Juniper Woodland (CEGL000861)		Rank	Count
Southern Limestone Plateau	Hell Canyon/Jewel Cave (32)	AB	1
	Hell Canyon/Jewel Cave (32)	B	1
Southwestern Foothills	Elk/Pilger Mountains (36)	B	2
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		4
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**133%**

Ponderosa Pine / Sedge Woodland (CEGL000849)		Rank	Count
Eastern Foothills	Wind Cave/Custer (40)	A	1
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	AB	1
Southern Central Core	Rapid Creek (26)	B	1
Southwestern Foothills	Elk/Pilger Mountains (36)	AB	1
	Elk/Pilger Mountains (36)	B	1
	Hell Canyon/Jewel Cave (32)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		6
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**200%**

Ponderosa Pine / Western Wheatgrass Woodland (CEGL000188)		Rank	Count
Eastern Foothills	Wind Cave/Custer (40)	A	1
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**67%**

Upland Aspen System

SUMMARY INFORMATION	Conservation Goal	#Captured in Sites	Percent of Goal	Cannot Meet
Aspen / Beaked Hazel Forest (CEGL000583)	5	5	100%	
Aspen / Bracken Fern Forest (CEGL000597)	5	2	40%	X (1)
Aspen / Shiny-leaf Spiraea Forest (CEGL000607)	5	3	60%	X (2)

DETAIL INFORMATION

Aspen / Beaked Hazel Forest (CEGL000583)		Rank	Count
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	B	1
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	B	1
Northwestern Foothills	Cranberry Springs (6)	AB	3
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		5
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Aspen / Bracken Fern Forest (CEGL000597)		Rank	Count
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	B	1
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**40%**

Aspen / Shiny-leaf Spiraea Forest (CEGL000607)		Rank	Count
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	B	2
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		3
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**60%**

Prairie System

SUMMARY INFORMATION	Conservation Goal	#Captured in Sites	Percent of Goal	Cannot Meet
Needle-and-Thread - Blue Grama Mixedgrass Prairie (CEGL002037)	2	4	200%	
Northern Great Plains Little Bluestem Prairie (CEGL001681)	3	9	300%	
Northern Plains Big Bluestem Prairie (CEGL002205)	2	1	50%	
Western Wheatgrass - Blue Grama - Threadleaf Sedge Prairie (CEGL001579)	2	1	50%	
Western Wheatgrass - Green Needlegrass Mixedgrass Prairie (CEGL001583)	3	2	67%	
Wheatgrass - Needle-and-Thread Mixedgrass Prairie (CEGL002034)	3	3	100%	

DETAIL INFORMATION

Needle-and-Thread - Blue Grama Mixedgrass Prairie (CEGL002037)		Rank	Count
Eastern Foothills	Wind Cave/Custer (40)	AB	1
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	AB	1
Southwestern Foothills	Elk/Pilger Mountains (36)	B	2
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIC		4
	CONSERVATION GOAL		**2**
	PERCENT GOAL CAPTURED BY PORTFOLIC		**200%**

Northern Great Plains Little Bluestem Prairie (CEGL001681)		Rank	Count
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	B	1
Eastern Foothills	Davenport Cave/Beaver Park (11)	B	1
	Northern Hills Spring Creek (4)	BC	1
	Wind Cave/Custer (40)	A	1
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	AB	1
	Northern Hills Spring Creek (4)	B	1
Southwestern Foothills	Elk/Pilger Mountains (36)	B	1
	Elk/Pilger Mountains (36)	BC	1
	Hell Canyon/Jewel Cave (32)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIC		9
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIC		**300%**

Northern Plains Big Bluestem Prairie (CEGL002205)		Rank	Count
Eastern Foothills	Northern Hills Spring Creek (4)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIC		1
	CONSERVATION GOAL		**2**
	PERCENT GOAL CAPTURED BY PORTFOLIC		**50%**

Western Wheatgrass - Blue Grama - Threadleaf Sedge Prairie (CEGL001579)		Rank	Count
Southwestern Foothills	Elk/Pilger Mountains (36)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIC		1
	CONSERVATION GOAL		**2**
	PERCENT GOAL CAPTURED BY PORTFOLIC		**50%**

Western Wheatgrass - Green Needlegrass Mixedgrass Prairie (CEGL001583)		Rank	Count
Eastern Foothills	Wind Cave/Custer (40)	AB	1
Southern Central Core	Slate Prairie (24)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**67%**

Wheatgrass - Needle-and-Thread Mixedgrass Prairie (CEGL002034)		Rank	Count
Eastern Foothills	Wind Cave/Custer (40)	A	1
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	AB	1
Southwestern Foothills	Hell Canyon/Jewel Cave (32)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		3
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

High Elevation Wetland System

SUMMARY INFORMATION	Conservation Goal	#Captured in Sites	Percent of Goal	Cannot Meet
Beaked Willow Scrub (CEGL001173)	6	10	167%	
Black Hills Streamside Vegetation (CEGL005262)	6	7	117%	
Canadian Reedgrass Wet Meadow (CEGL001559)	6	6	100%	
Nebraska Sedge Wet Meadow (CEGL001813)	6	12	200%	
Prairie Cordgrass - Sedge Wet Meadow (CEGL001477)	6	5	83%	

DETAIL INFORMATION

Beaked Willow Scrub (CEGL001173)		Rank	Count
Northern Central Core	Black Fox (22)	AB	1
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	B	1
	Little Spearfish Creek (14)	AB	1
	Spearfish Canyon (13)	AB	2
Southern Central Core	Castle Creek (21)	D	1
	French Creek (31)	BC	1
	High Granite Region (29)	AB	1
	Reno Gulch (28)	BC	1
	Upper Grace Coolidge Creek (30)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		10
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**167%**

Black Hills Streamside Vegetation (CEGL005262)		Rank	Count
Northern Central Core	Black Fox (22)	AB	1
Northern Limestone Plateau	Little Spearfish Creek (14)	A	1
Southern Central Core	Canyon City (25)	B	1
	High Granite Region (29)	A	1
	High Granite Region (29)	AB	1
	High Granite Region (29)	B	1
	Upper Grace Coolidge Creek (30)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		7
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**117%**

Canadian Reedgrass Wet Meadow (CEGL001559)		**Rank**	**Count**
Southern Central Core	French Creek (31)	BC	1
	High Granite Region (29)	A	1
	High Granite Region (29)	B	1
	High Granite Region (29)	C?	1
	Upper Grace Coolidge Creek (30)	AB	2
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIC		6
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIC		**100%**

Nebraska Sedge Wet Meadow (CEGL001813)		**Rank**	**Count**
Northern Central Core	Black Fox (22)	AB	1
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	B	1
	Little Spearfish Creek (14)	B	1
	Spearfish Canyon (13)	B	1
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	B?	1
Southern Central Core	Canyon City (25)	BC?	1
	Castle Creek (21)	AB	1
	French Creek (31)	BC	1
	High Granite Region (29)	B	1
	High Granite Region (29)	C?	1
	Reno Gulch (28)	BC	1
	Upper Grace Coolidge Creek (30)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIC		12
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIC		**200%**

Prairie Cordgrass - Sedge Wet Meadow (CEGL001477)		**Rank**	**Count**
Eastern Foothills	Northern Hills Spring Creek (4)	B	1
	Wind Cave/Custer (40)	B	1
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	BC	1
Southern Central Core	French Creek (31)	BC	1
	Upper Grace Coolidge Creek (30)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIC		5
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIC		**83%**

Low Elevation Floodplain System

SUMMARY INFORMATION	Conservation Goal	#Captured in Sites	Percent of Goal	Cannot Meet
Ash - Elm / Wolfberry Forest (CEGL002082)	6	2	33%	X (2)
Box Elder / Chokecherry Forest (CEGL000628)	6	2	33%	X (2)
Cottonwood - Peach-Leaf Willow Floodplain Woodland (CEGL000659)	6	1	17%	X (2)
Cottonwood / Wolfberry Floodplain Woodland (CEGL000660)	6	1	17%	X (1)
Sandbar Willow Shrubland (CEGL001197)	6	2	33%	
Silver Sagebrush / Western Wheatgrass Shrub Prairie (CEGL001072)	3	1	33%	X (1)
Western Snowberry Shrubland (CEGL001131)	3	6	200%	

DETAIL INFORMATION

Ash - Elm / Wolfberry Forest (CEGL002082)

		Rank	Count
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	BC	1
Southern Central Core	French Creek (31)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**33%**

Box Elder / Chokecherry Forest (CEGL000628)

		Rank	Count
Southern Central Core	High Granite Region (29)	B	1
Southwestern Foothills	Hell Canyon/Jewel Cave (32)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**33%**

Cottonwood - Peach-Leaf Willow Floodplain Woodland (CEGL000659)

		Rank	Count
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	C	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**17%**

Cottonwood / Wolfberry Floodplain Woodland (CEGL000660)

		Rank	Count
Eastern Foothills	Wind Cave/Custer (40)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**17%**

Sandbar Willow Shrubland (CEGL001197)

		Rank	Count
Northern Central Core	Canyon City (25)	AB	1
Southern Central Core	French Creek (31)	BC	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**33%**

Silver Sagebrush / Western Wheatgrass Shrub Prairie (CEGL001072)

		Rank	Count
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**33%**

Western Snowberry Shrubland (CEGL001131)		Rank	Count
Eastern Foothills	Davenport Cave/Beaver Park (11)	AB	1
	Davenport Cave/Beaver Park (11)	B	1
	Wind Cave/Custer (40)	AB	1
Northern Central Core	Canyon City (25)	B	1
Southern Central Core	Reno Gulch (28)	BC	1
Southern Limestone Plateau	Hell Canyon/Jewel Cave (32)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIC		6
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIC		**200%**

High Elevation Riparian System

SUMMARY INFORMATION	Conservation Goal	#Captured in Sites	Percent of Goal	Cannot Meet
Beaked Willow Scrub (CEGL001173)	6	10	167%	
Black Hills Streamside Vegetation (CEGL005262)	6	7	117%	
Sandbar Willow Shrubland (CEGL001197)	6	2	33%	
Water Birch / Red-osier Dogwood Shrubland (CEGL001161)	6	3	50%	X (3)
White Spruce Alluvial Black Hills Forest (CEGL002057)	6	12	200%	

DETAIL INFORMATION

Beaked Willow Scrub (CEGL001173)		Rank	Count
Northern Central Core	Black Fox (22)	AB	1
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	B	1
	Little Spearfish Creek (14)	AB	1
	Spearfish Canyon (13)	AB	2
Southern Central Core	Castle Creek (21)	D	1
	French Creek (31)	BC	1
	High Granite Region (29)	AB	1
	Reno Gulch (28)	BC	1
	Upper Grace Coolidge Creek (30)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIC		10
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIC		**167%**

Black Hills Streamside Vegetation (CEGL005262)		Rank	Count
Northern Central Core	Black Fox (22)	AB	1
Northern Limestone Plateau	Little Spearfish Creek (14)	A	1
Southern Central Core	Canyon City (25)	B	1
	High Granite Region (29)	A	1
	High Granite Region (29)	AB	1
	High Granite Region (29)	B	1
	Upper Grace Coolidge Creek (30)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIC		7
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIC		**117%**

Sandbar Willow Shrubland (CEGL001197)		**Rank**	**Count**
Northern Central Core	Canyon City (25)	AB	1
Southern Central Core	French Creek (31)	BC	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**33%**

Water Birch / Red-osier Dogwood Shrubland (CEGL001161)		**Rank**	**Count**
Northern Central Core	Canyon City (25)	AB	1
Southern Central Core	French Creek (31)	BC	1
	Rapid Creek (26)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		3
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**50%**

White Spruce Alluvial Black Hills Forest (CEGL002057)		**Rank**	**Count**
Northern Central Core	Black Fox (22)	B	1
	Canyon City (25)	AB	1
Northern Limestone Plateau	Little Spearfish Creek (14)	B	1
	Spearfish Canyon (13)	AB	1
	Spearfish Canyon (13)	B	1
Southern Central Core	High Granite Region (29)	A	3
	High Granite Region (29)	AB	2
	High Granite Region (29)	B	1
	Upper Grace Coolidge Creek (30)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		12
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**200%**

Single Association Systems

SUMMARY INFORMATION	Conservation Goal	#Captured in Sites	Percent of Goal	Cannot Meet
Alkali Sacaton Saline Prairie (CEGL002274)	6	0	0%	X (0)
Big Sagebrush / Western Wheatgrass Shrub Grassland (CEGL001047)	2	0	0%	X (0)
Black Hawthorne Shrubland (CEGL001093)	6	5	83%	X (5)
Black Hills Granite/Metamorphic Rock Outcrop (CEGL002295)	3	5	167%	
Black Hills Montane Grassland (CEGL002240)	9	18	200%	
Black Hills Talus (CEGL002307)	3	0	0%	X (0)
Bur Oak / Chokecherry - Western Snowberry Woodland (CEGL002138)	3	1	33%	X (2)
Bur Oak / Sedge Woodland (CEGL000554)	9	2	22%	X (0)
Bur Oak-Ironwood Forest (CEGL000555)	6	5	83%	
Chokecherry Shrubland (CEGL001108)	3	1	33%	X (1)
Creeping Juniper / Little Bluestem Dwarf-shrubland (CEGL001394)	2	3	150%	
Creeping Spikerush Wet Meadow (CEGL001833)	6	1	17%	X (1)
Great Plains Cattail - Bulrush Marsh (CEGL002228)	6	1	17%	X (1)
Ill-scented Sumac / Bluebunch Wheatgrass Shrub Prairie (CEGL001120)	2	1	50%	X (1)
Mountain Mahogany / Side-oats Grama Shrubland (CEGL001086)	2	2	100%	
Narrowleaf Cottonwood / Red-osier Dogwood Forest (CEGL002664)	6	0	0%	X (2)
Northern Great Plains Cattail Marsh (CEGL002389)	6	4	67%	
Paper Birch / Hazel Forest (CEGL002079)	6	12	200%	
Ponderosa Pine / Oregon Grape Forest (CEGL000187)	3	1	33%	X (1)
Ponderosa Pine Limestone Cliff (CEGL002055)	3	2	67%	X (1)
Ponderosa Pine Scree Slope (CEGL000878)	3	1	33%	X (2)
Prairie Dog Town Grassland Complex (CECX002003)	3	2	67%	X (2)
Redbeds (Siltstone) Rock Outcrop (CEGL005261)	3	2	67%	X (2)
Rocky Mountain Juniper / Little-seed Ricegrass Woodland (CEGL000747)	2	1	50%	X (1)
Sage Willow Fen (CEGL001188)	6	1	17%	X (1)
Shale Barren Slopes (CEGL002294)	3	0	0%	X (0)
Western Great Plains Streamside Vegetation (CEGL005263)	6	2	33%	X (3)
White Spruce/Grouseberry Forest (CEGL000383)	9	0	0%	X (2)
White Spruce/Twinflower Forest (CEGL000382)	5	9	180%	

DETAIL INFORMATION

Alkali Sacaton Saline Prairie (CEGL002274)

	Rank	Count
No sites include this target		0
TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
CONSERVATION GOAL		6
PERCENT GOAL CAPTURED BY PORTFOLIO		0%

Big Sagebrush / Western Wheatgrass Shrub Grassland (CEGL001047)

	Rank	Count
No sites include this target		0
TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
CONSERVATION GOAL		2
PERCENT GOAL CAPTURED BY PORTFOLIO		0%

Black Hawthorne Shrubland (CEGL001093)		**Rank**	**Count**
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	B	2
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	B	1
Northwestern Foothills	Bear Lodge/Beaver Creek (2)	B	1
	Dugout Gulch (5)		1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		5
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**83%**

Black Hills Granite/Metamorphic Rock Outcrop (CEGL002295)		**Rank**	**Count**
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	A	1
	Upper Sand Creek (16)	B	1
Southern Central Core	High Granite Region (29)	A	2
	Wind Cave/Custer (40)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		5
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**167%**

Black Hills Montane Grassland (CEGL002240)		**Rank**	**Count**
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)		1
	Bear Lodge/Beaver Creek (2)	B	1
Northern Limestone Plateau	Castle Creek (21)	BC	1
	Cement Ridge/Sand Creek Headwaters (8)	B	1
	Eagle Cliffs (15)		1
	Stockade Beaver Creek (20)	BC	1
Southern Central Core	Castle Creek (21)	C	1
	Reynolds Prairie (23)	B	1
	Reynolds Prairie (23)	C?	1
	Slate Prairie (24)		1
	Slate Prairie (24)	B?	1
Southern Limestone Plateau	Bad Luck Cave (35)	BC?	1
	Bear Spring/Lemming Draw (33)	AB	1
	Bear Spring/Lemming Draw (33)	B	1
	Castle Creek (21)	BC?	1
	Gillette Canyon (34)	AB	2
	Stockade Beaver Creek (20)	BC	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		18
	CONSERVATION GOAL		**9**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**200%**

Black Hills Talus (CEGL002307)		**Rank**	**Count**
	No sites include this target		0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Bur Oak / Chokecherry - Western Snowberry Woodland (CEGL002138)		**Rank**	**Count**
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**33%**

Bur Oak / Sedge Woodland (CEGL000554)		**Rank**	**Count**
Eastern Foothills	Oak Shale Savanna ()		1
Northwestern Foothills	Oak Shale Savanna ()		1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**9**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**22%**

Bur Oak-Ironwood Forest (CEGL000555)		**Rank**	**Count**
Eastern Foothills	Davenport Cave/Beaver Park (11)	AB	2
Northern Limestone Plateau	Davenport Cave/Beaver Park (11)	B	1
Northwestern Foothills	Dugout Gulch (5)	B	1
Southern Central Core	High Granite Region (29)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		5
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**83%**

Chokecherry Shrubland (CEGL001108)		**Rank**	**Count**
Eastern Foothills	Wind Cave/Custer (40)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**33%**

Creeping Juniper / Little Bluestem Dwarf-shrubland (CEGL001394)		**Rank**	**Count**
Eastern Foothills	Davenport Cave/Beaver Park (11)	B	2
	Wind Cave/Custer (40)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		3
	CONSERVATION GOAL		**2**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**150%**

Creeping Spikerush Wet Meadow (CEGL001833)		**Rank**	**Count**
Eastern Foothills	Wind Cave/Custer (40)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**17%**

Great Plains Cattail - Bulrush Marsh (CEGL002228)		**Rank**	**Count**
Eastern Foothills	Northern Hills Spring Creek (4)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**17%**

Great Plains Weedy Meadows (CEGL005260)		**Rank**	**Count**
	No sites include this target		0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		
	PERCENT GOAL CAPTURED BY PORTFOLIO		

Ill-scented Sumac / Bluebunch Wheatgrass Shrub Prairie (CEGL001120)		**Rank**	**Count**
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**2**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**50%**

Mountain Mahogany / Side-oats Grama Shrubland (CEGL001086)		**Rank**	**Count**
Eastern Foothills	Wind Cave/Custer (40)	A	1
Southwestern Foothills	Stockade Beaver Creek (20)	A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**2**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Narrowleaf Cottonwood / Red-osier Dogwood Forest (CEGL002664)		**Rank**	**Count**
	No sites include this target		0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Northern Great Plains Cattail Marsh (CEGL002389)		**Rank**	**Count**
Eastern Foothills	French Creek (31)	AB	1
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	B	1
Southern Central Core	French Creek (31)	BC	1
	Upper Grace Coolidge Creek (30)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		4
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**67%**

Paper Birch / Hazel Forest (CEGL002079)		**Rank**	**Count**
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	B	1
Eastern Foothills	Bear Beaver Gulch (9)	B	1
Northern Central Core	Canyon City (25)	AB	1
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	B	1
	Davenport Cave/Beaver Park (11)	AB	1
	Little Spearfish Creek (14)	AB	1
	Sand Creek Botanical Area (7)	B	1
	Spearfish Canyon (13)	AB	1
Northwestern Foothills	Cranberry Springs (6)	AB	2
	Dugout Gulch (5)	AB	1
Southern Central Core	High Granite Region (29)	A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		12
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**200%**

Ponderosa Pine / Oregon Grape Forest (CEGL000187)		**Rank**	**Count**
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**33%**

Ponderosa Pine Limestone Cliff (CEGL002055)		**Rank**	**Count**
Northern Limestone Plateau	Spearfish Canyon (13)	A	1
Southern Central Core	Wind Cave/Custer (40)	A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**67%**

Ponderosa Pine Scree Slope (CEGL000878)		**Rank**	**Count**
Northern Central Core	Canyon City (25)	A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**33%**

Prairie Dog Town Grassland Complex (CECX002003)		**Rank**	**Count**
Eastern Foothills	Wind Cave/Custer (40)	AB	1
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	BC	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**67%**

Redbeds (Siltstone) Rock Outcrop (CEGL005261)		**Rank**	**Count**
Eastern Foothills	Wind Cave/Custer (40)	A	1
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**67%**

Rocky Mountain Juniper / Little-seed Ricegrass Woodland (CEGL000747)		**Rank**	**Count**
Southwestern Foothills	Stockade Beaver Creek (20)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**2**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**50%**

Sage Willow Fen (CEGL001188)		**Rank**	**Count**
Southern Central Core	Castle Creek (21)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**17%**

Shale Barren Slopes (CEGL002294)		**Rank**	**Count**
	No sites include this target		0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Western Great Plains Streamside Vegetation (CEGL005263)		**Rank**	**Count**
Eastern Foothills	Wind Cave/Custer (40)	A	1
Southern Central Core	French Creek (31)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**33%**

White Spruce/Grouseberry Forest (CEGL000383)		**Rank**	**Count**
	No sites include this target		0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**9**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

White Spruce/Twinflower Forest (CEGL000382)		**Rank**	**Count**
Northern Central Core	Black Fox (22)	B	1
Northern Limestone Plateau	Eagle Cliffs (15)		1
	Little Spearfish Creek (14)		1
	Spearfish Canyon (13)		1
Southern Central Core	Canyon City (25)	B	1
	Castle Creek (21)	B	1
	High Granite Region (29)	AB	2
	High Granite Region (29)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		9
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**180%**

Primary Plant Targets

SUMMARY INFORMATION	Conservation Goal	#Captured in Sites	Percent of Goal	Cannot Meet
Autumn Coral-root (PMORC0M030)	5	0	0%	X (2)
Autumn Willow (PDSAL022P0)	5	1	20%	X (3)
Blunt-broom Sedge (PMCYP03DW0)	1	1	100%	
Dwarf Scouring Rush (PPEQU01080)	5	6	120%	
Foxtail Sedge (PMCYP030K0)	5	5	100%	
Giant Helleborine (PMORC11010)	1	1	100%	
Great-spurred Violet (PDVIO04200)	5	8	160%	
Large Roundleaf Orchid (PMORC1Y0K0)	5	7	140%	
Prairie Dunewort (PPOPH010W0)	1	3	300%	
Southern Maidenhair-fern (PPADI03010)	1	1	100%	
Spinulose Shield Fern (PPDRY0A040)	1	1	100%	
Trailing Clubmoss (PPLYC01090)	5	4	80%	X (4)

DETAIL INFORMATION

Autumn Coral-root (Corallorrhiza odontorhiza)		Rank	Count
	No sites include this target	N/A	0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Autumn Willow (Salix serissima)		Rank	Count
Southern Central Core	Castle Creek (21)	A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**20%**

Blunt-broom Sedge (Carex tribuloides)		Rank	Count
Southern Central Core	French Creek (31)	E	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**1**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Dwarf Scouring Rush (Equisetum scirpoides)		Rank	Count
Eastern Foothills	Bear Beaver Gulch (9)	A	1
	Northern Hills Spring Creek (4)	N/A	1
	Northern Hills Spring Creek (4)	B	1
Northern Limestone Plateau	Sand Creek Botanical Area (7)	B	1
	Spearfish Canyon (13)	H	1
Northwestern Foothills	Cranberry Springs (6)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		6
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**120%**

Foxtail Sedge (Carex alopecoidea)		**Rank**	**Count**
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	N/A	1
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	C	1
	Cement Ridge/Sand Creek Headwaters (8)	E	1
	Sand Creek Botanical Area (7)	B	1
Northwestern Foothills	Dugout Gulch (5)	E	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		5
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Giant Helleborine (Epipactis gigantea)		**Rank**	**Count**
Southwestern Foothills	Cheyenne River Canyons (37)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**1**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Great-spurred Violet (Viola selkirkii)		**Rank**	**Count**
Southern Central Core	High Granite Region (29)	A	4
	High Granite Region (29)	AB	2
	High Granite Region (29)	B?	1
	High Granite Region (29)	H	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		8
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**160%**

Large Roundleaf Orchid (Platanthera orbiculata)		**Rank**	**Count**
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	C	1
	Bear Lodge/Beaver Creek (2)	D	1
Eastern Foothills	Bear Beaver Gulch (9)	A	1
	Northern Hills Spring Creek (4)	N/A	1
Northern Limestone Plateau	Bear Beaver Gulch (9)	E	2
Southern Central Core	High Granite Region (29)	C?	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		7
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**140%**

Prairie Dunewort (Botrychium campestre)		**Rank**	**Count**
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	N/A	1
	Bear Lodge/Beaver Creek (2)	X?	1
Southern Central Core	High Granite Region (29)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		3
	CONSERVATION GOAL		**1**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**300%**

Southern Maidenhair-fern (Adiantum capillus-veneris)		**Rank**	**Count**
Southwestern Foothills	Cheyenne River Canyons (37)	A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**1**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Spinulose Shield Fern (Dryopteris carthusiana)		Rank	Count
Southern Central Core	High Granite Region (29)	E	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**1**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Trailing Clubmoss (Lycopodium complanatum)		Rank	Count
Northern Central Core	Bear Butte Creek (12)	B	1
Northern Limestone Plateau	Bear Beaver Gulch (9)	A	1
	Bear Beaver Gulch (9)	B	1
	Cement Ridge/Sand Creek Headwaters (8)	AB	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		4
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**80%**

Primary Animal Targets

SUMMARY INFORMATION	Conservation Goal	#Captured in Sites	Percent of Goal	Cannot Meet
Endemic G3 springtail (BHANIM001)	9	1	11%	X (1)
A Tiger Beetle (IICOL0C010)	3	4	133%	
American Dipper (ABPBH01010)	4	14	350%	
Atlantis Fritillary (IILEPJ6112)	9	0	0%	X (0)
Berry's Rocky Mountainsnail (IMGASB5328)	9	4	44%	X (4)
Black Hills Flying Squirrel (AMAFB09020)	7	4	57%	
Black Hills Redbelly Snake (ARADB34033)	7	18	257%	
Catinella gelida (IMGAS66120)	6	4	67%	X (4)
Cooper's Rocky Mountainsnail (IMGASB5327)	9	26	289%	
Dakota Vertigo (IMGAS20050)	6	6	100%	
Finescale Dace (AFCJB31040)	3	6	200%	
Fringe-tailed Myotis (AMACC01091)	7	6	86%	
Lake Chub (AFCJB06010)	3	4	133%	
Mountain Sucker (AFCJC02160)	3	0	0%	X (0)
Mystery Vertigo (IMGAS20420)	3	2	67%	
Pahasapa Mountainsnail (IMGASB5329??)	6	10	167%	
Striate Disc (IMGAS54120)	3	10	333%	
Tawny Crescent (IILEPK3040)	3	16	533%	
Townsend's Big-eared Bat (AMACC08010)	3	7	233%	

DETAIL INFORMATION

Endemic G3 springtail (Endemic G3 springtail)		Rank	Count
Eastern Foothills	Davenport Cave/Beaver Park (11)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**9**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**11%**

A Tiger Beetle (Amblycheila cylindriformis)		**Rank**	**Count**
Outside Ecoregion	Angostura Reservoir South ()	N/A	1
Southwestern Foothills	Angostura Reservoir (38)	N/A	1
	Cheyenne River Canyons (37)	N/A	2
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		4
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**133%**

American Dipper (Cinclus mexicanus)		**Rank**	**Count**
Eastern Foothills	Rapid Creek (26)	N/A	1
	Whitewood Cave (10)	N/A	1
Northern Limestone Plateau	Spearfish Canyon (13)	N/A	8
	Spearfish Canyon (13)	B	2
Southern Central Core	French Creek (31)	N/A	1
	Rapid Creek (26)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		14
	CONSERVATION GOAL		**4**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**350%**

Atlantis Fritillary (Speyeria atlantis pahasapa)		**Rank**	**Count**
	No sites include this target	N/A	0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**9**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Berry's Rocky Mountainsnail (Oreohelix strigosa berryi)		**Rank**	**Count**
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	N/A	2
	Reuter Canyon (3)	N/A	2
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		4
	CONSERVATION GOAL		**9**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**44%**

Black Hills Flying Squirrel (Glaucomys sabrinus)		**Rank**	**Count**
Eastern Foothills	Wind Cave/Custer (40)	N/A	1
Northern Limestone Plateau	Bear Beaver Gulch (9)	N/A	1
	Little Spearfish Creek (14)	N/A	1
Southern Central Core	Rapid Creek (26)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		4
	CONSERVATION GOAL		**7**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**57%**

Black Hills Redbelly Snake (Storeria occipitomaculata pahasapae)		**Rank**	**Count**
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	N/A	1
	Bear Lodge/Beaver Creek (2)	E	2
Eastern Foothills	Northern Hills Spring Creek (4)	N/A	1
Northern Central Core	Bear Butte Creek (12)	N/A	1
Northern Limestone Plateau	Bear Beaver Gulch (9)	C	1
	Spearfish Canyon (13)	N/A	1
	Spearfish Canyon (13)	B	1
Northwestern Foothills	Upper Sand Creek (16)	N/A	1
Southern Central Core	French Creek (31)	N/A	5
	High Granite Region (29)	N/A	1
	Hill City Samelius (27)	N/A	1
	Reynolds Prairie (23)	N/A	1
	Samelius Snake Site (27)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		18
	CONSERVATION GOAL		**7**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**257%**

Catinella gelida (Catinella gelida)		**Rank**	**Count**
Northern Limestone Plateau	Little Spearfish Creek (14)	N/A	1
	Spearfish Canyon (13)	N/A	1
Southern Central Core	Canyon City (25)	N/A	1
	Reno Gulch (28)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		4
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**67%**

Cooper's Rocky Mountainsnail (Oreohelix strigosa cooperi)		**Rank**	**Count**
Northern Central Core	Black Fox (22)	N/A	1
Northern Limestone Plateau	Bear Beaver Gulch (9)	N/A	1
	Castle Creek (21)	N/A	2
	Little Spearfish Creek (14)	N/A	4
	Spearfish Canyon (13)	N/A	16
Southern Limestone Plateau	Gillette Canyon (34)	N/A	1
	Stockade Beaver Creek (20)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		26
	CONSERVATION GOAL		**9**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**289%**

Dakota Vertigo (Vertigo arthuri)		**Rank**	**Count**
Northern Limestone Plateau	Spearfish Canyon (13)	N/A	1
Southern Central Core	Canyon City (25)	N/A	1
	French Creek (31)	N/A	1
Southwestern Foothills	Stockade Beaver Creek (20)	N/A	3
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		6
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Finescale Dace (Phoxinus neogaeus)		**Rank**	**Count**
Eastern Foothills	Northern Hills Spring Creek (4)	N/A	5
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	E	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		6
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**200%**

Fringe-tailed Myotis (Myotis thysanodes pahasapensis)		**Rank**	**Count**
Eastern Foothills	Whitewood Cave (10)	N/A	1
Northern Limestone Plateau	Davenport Cave/Beaver Park (11)	N/A	1
Southern Limestone Plateau	Gillette Canyon (34)	N/A	1
	Hell Canyon/Jewel Cave (32)	N/A	1
Southwestern Foothills	Cheyenne River Canyons (37)	N/A	1
	Stockade Beaver Creek (20)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		6
	CONSERVATION GOAL		**7**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**86%**

Lake Chub (Couesius plumbeus)		**Rank**	**Count**
Southern Central Core	Castle Creek (21)	N/A	2
	French Creek (31)	N/A	1
	Rapid Creek (26)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		4
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**133%**

Mountain Sucker (Catostomus platyrhynchus)		**Rank**	**Count**
	No sites include this target	N/A	0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Mystery Vertigo (Vertigo paradoxa)		**Rank**	**Count**
Southern Central Core	Reno Gulch (28)	N/A	1
Southern Limestone Plateau	Gillette Canyon (34)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**67%**

Pahasapa Mountainsnail (Oreohelix strigosa new subspecies)		**Rank**	**Count**
Northern Limestone Plateau	Spearfish Canyon (13)	N/A	7
Southern Limestone Plateau	Gillette Canyon (34)	N/A	1
Southewestern Foothills	Stockade Beaver Creek (20)	N/A	1
Southwestern Foothills	Stockade Beaver Creek (20)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		10
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**167%**

Striate Disc (Discus shimeki)		**Rank**	**Count**
Northern Limestone Plateau	Spearfish Canyon (13)	N/A	5
Southern Central Core	Castle Creek (21)	N/A	1
	Reno Gulch (28)	N/A	2
Southern Limestone Plateau	Gillette Canyon (34)	N/A	2
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		10
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**333%**

Tawny Crescent (Phyciodes batesii)		**Rank**	**Count**
Eastern Foothills	Northern Hills Spring Creek (4)	N/A	2
Northern Limestone Plateau	Bear Beaver Gulch (9)	N/A	1
	Little Spearfish Creek (14)	N/A	3
	Spearfish Canyon (13)	N/A	2
Southern Central Core	French Creek (31)	N/A	1
	Rapid Creek (26)	N/A	1
Southern Limestone Plateau	Bear Spring/Lemming Draw (33)	N/A	1
	Castle Creek (21)	N/A	1
	Gillette Canyon (34)	N/A	1
Southwestern Foothills	Cheyenne River Canyons (37)	N/A	1
	Hell Canyon/Jewel Cave (32)	N/A	2
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		16
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**533%**

Townsend's Big-eared Bat (Corynorhinus townsendii)		**Rank**	**Count**
Eastern Foothills	Fall River (39)	N/A	1
	Rapid Creek (26)	N/A	1
	Whitewood Cave (10)	N/A	1
Northern Limestone Plateau	Davenport Cave/Beaver Park (11)	N/A	1
Southern Limestone Plateau	Bad Luck Cave (35)	N/A	1
	Hell Canyon/Jewel Cave (32)	N/A	1
Southwestern Foothills	Cheyenne River Canyons (37)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		7
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**233%**

Secondary Plant Targets

SUMMARY INFORMATION	Conservation Goal	#Captured in Sites	Percent of Goal	Cannot Meet
American Rock-brake (PPADI0B030)	5	0	0%	X (1)
Arrow-leaved Sweet-coltsfoot (PDAST71040)	5	2	40%	
Beaked Spikerush (PMCYP091P0)	5	1	20%	X (1)
Black-girdle Bulrush (PMCYP0Q040)	5	11	220%	
Bloodroot (PDPAP0M010)	5	5	100%	
Bristly-stalk Sedge (PMCYP037E0)	5	3	60%	
Broad-leaved Twayblade (PMORC1N050)	5	1	20%	X (2)
Elegant Sedge (PMCYP031N0)	5	1	20%	X (1)
Gray's Lousewort (PDSCR1K0W0)	5	0	0%	
Green Spleenwort (PPASP02250)	5	2	40%	
Hoary Willow (PDSAL020K0)	5	0	0%	X (1)
Large Yellow Ladies Slipper (BHPLAN001)	5	1	20%	X (1)
Limber Pine (PGPIN040F0)	5	1	20%	X (1)
Longstalk Sedge (PMCYP03AA0)	5	10	200%	
Maidenhair Spleenwort (PPASP021K0)	5	5	100%	
Marsh Muhly (PMPOA480U0)	5	4	80%	
Mountain Cat's-eye (PDBOR0A0D0)	1	1	100%	
Musk-root (PDADO01010)	5	12	240%	
Northern Holly-fern (PPDRY0R0F0)	5	7	140%	
Secund Bladderpod (PDBRA1N042)	3	2	67%	
Showy Prairie-gentian (PDGEN04030)	5	1	20%	X (1)
Square-twigged Huckleberry (PDERI180K0)	5	3	60%	
Stiff Clubmoss (PPLYC01030)	5	3	60%	X (3)
Treelike Clubmoss (PPLYC010B0)	5	20	400%	
Variegated Horsetail (PPEQU010B0)	5	1	20%	X (1)
Woodland Horsetail (PPEQU01090)	5	2	40%	X (2)

DETAIL INFORMATION

American Rock-brake (Cryptogramma acrostichoides)

		Rank	Count
	No sites include this target	N/A	0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Arrow-leaved Sweet-coltsfoot (Petasites sagittatus)

		Rank	Count
Northern Central Core	Black Fox (22)	N/A	1
	Black Fox (22)	A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**40%**

Beaked Spikerush (Eleocharis rostellata)		**Rank**	**Count**
Southwestern Foothills	Cheyenne River Canyons (37)	A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**20%**

Black-girdle Bulrush (Scirpus atrocinctus)		**Rank**	**Count**
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	B	2
	Bear Lodge/Beaver Creek (2)	BC	3
	Bear Lodge/Beaver Creek (2)	C	2
	Bear Lodge/Beaver Creek (2)	CD	3
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	X?	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		11
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**220%**

Bloodroot (Sanguinaria canadensis)		**Rank**	**Count**
Eastern Foothills	Davenport Cave/Beaver Park (11)	N/A	4
Northern Limestone Plateau	Davenport Cave/Beaver Park (11)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		5
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Bristly-stalk Sedge (Carex leptalea)		**Rank**	**Count**
Northern Central Core	Black Fox (22)	A	1
Northern Limestone Plateau	Spearfish Canyon (13)	B	1
Southern Central Core	High Granite Region (29)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		3
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**60%**

Broad-leaved Twayblade (Listera convallarioides)		**Rank**	**Count**
Northern Central Core	Bear Butte Creek (12)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**20%**

Elegant Sedge (Carex bella)		**Rank**	**Count**
Southern Central Core	High Granite Region (29)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**20%**

Gray's Lousewort (Pedicularis procera)		**Rank**	**Count**
	No sites include this target	N/A	0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Green Spleenwort (Asplenium trichomanes-ramosum)		**Rank**	**Count**
Northern Limestone Plateau	Spearfish Canyon (13)	A	1
	Spearfish Canyon (13)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**40%**

Hoary Willow (Salix candida)		**Rank**	**Count**
	No sites include this target	N/A	0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Large Yellow Ladies Slipper (Cypripedium calceolus var pubescens)		**Rank**	**Count**
Northwestern Foothills	Dugout Gulch (5)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**20%**

Limber Pine (Pinus flexilis)		**Rank**	**Count**
Southern Central Core	High Granite Region (29)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**20%**

Longstalk Sedge (Carex pedunculata)		**Rank**	**Count**
Eastern Foothills	Whitewood Cave (10)	N/A	1
Northern Limestone Plateau	Bear Beaver Gulch (9)	N/A	1
	Bear Butte Creek (12)	N/A	1
	Davenport Cave/Beaver Park (11)	N/A	1
	Spearfish Canyon (13)	N/A	5
Southern Central Core	High Granite Region (29)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		10
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**200%**

Maidenhair Spleenwort (Asplenium trichomanes)		**Rank**	**Count**
Southern Central Core	High Granite Region (29)	N/A	4
	High Granite Region (29)	A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		5
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Marsh Muhly (Muhlenbergia glomerata)		**Rank**	**Count**
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	E	1
Northern Limestone Plateau	Bear Beaver Gulch (9)	N/A	1
	Spearfish Canyon (13)	N/A	1
Northwestern Foothills	Upper Sand Creek (16)	E	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		4
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**80%**

Mountain Cat's-eye (Cryptantha cana)		**Rank**	**Count**
Southwestern Foothills	Cheyenne River Canyons (37)	A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**1**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Musk-root (Adoxa moschatellina)		**Rank**	**Count**
Eastern Foothills	Rapid Creek (26)	N/A	1
Northern Limestone Plateau	Sand Creek Botanical Area (7)	B	1
	Spearfish Canyon (13)	N/A	2
Northwestern Foothills	Cranberry Springs (6)	E	1
Southern Central Core	Canyon City (25)	N/A	1
	High Granite Region (29)	N/A	5
Southern Limestone Plateau	Hell Canyon/Jewel Cave (32)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		12
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**240%**

Northern Holly-fern (Polystichum lonchitis)		**Rank**	**Count**
Eastern Foothills	Bear Beaver Gulch (9)	B	1
	Dugout Gulch (5)	N/A	2
	Northern Hills Spring Creek (4)	N/A	1
Northern Limestone Plateau	Bear Beaver Gulch (9)	B	1
	Sand Creek Botanical Area (7)	A	1
	Spearfish Canyon (13)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		7
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**140%**

Secund Bladderpod (Lesquerella arenosa var argillosa)		**Rank**	**Count**
Southwestern Foothills	Cheyenne River Canyons (37)	N/A	1
	Cheyenne River Canyons (37)	B	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**67%**

Showy Prairie-gentian (Eustoma russellianum)		**Rank**	**Count**
Southwestern Foothills	Cheyenne River Canyons (37)	C	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**20%**

Square-twigged Huckleberry (Vaccinium membranaceum)		**Rank**	**Count**
Northern Central Core	Bear Butte Creek (12)	N/A	2
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	BC	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		3
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**60%**

Stiff Clubmoss (Lycopodium annotinum)		**Rank**	**Count**
Northern Central Core	Bear Butte Creek (12)	B	1
Northern Limestone Plateau	Bear Beaver Gulch (9)	B	1
	Cement Ridge/Sand Creek Headwaters (8)	A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		3
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**60%**

Treelike Clubmoss (Lycopodium dendroideum)		**Rank**	**Count**
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	A	1
	Bear Lodge/Beaver Creek (2)	AB	1
	Bear Lodge/Beaver Creek (2)	B	3
	Bear Lodge/Beaver Creek (2)	BC	4
Eastern Foothills	Davenport Cave/Beaver Park (11)	N/A	3
	Northern Hills Spring Creek (4)	N/A	3
Northern Central Core	Bear Butte Creek (12)	N/A	3
	Bear Butte Creek (12)	B	1
Northern Limestone Plateau	Bear Beaver Gulch (9)	BC	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		20
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**400%**

Variegated Horsetail (Equisetum variegatum)		**Rank**	**Count**
Eastern Foothills	Northern Hills Spring Creek (4)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**20%**

Woodland Horsetail (Equisetum sylvaticum)		**Rank**	**Count**
Northern Limestone Plateau	Cement Ridge/Sand Creek Headwaters (8)	E	1
Northwestern Foothills	Bear Lodge/Beaver Creek (2)	E	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**5**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**40%**

Secondary Animal Targets

SUMMARY INFORMATION	Conservation Goal	#Captured in Sites	Percent of Goal	Cannot Meet
American Peregrine Falcon (ABNKD06071)	3	0	0%	X (0)
Bald Eagle (ABNKC10010)	3	3	100%	
Bear Lodge Meadow Jumping Mouse (AMAFH01013)	6	6	100%	
Black Hills Red Squirrel (BHANIM002)	7	0	0%	X (0)
Black Hills Red-backed Vole (AMAFF09027)	7	0	0%	X (0)
Black-backed Woodpecker (ABNYF07090)	4	2	50%	X (3)
Black-tailed Prairie Dog (AMAFB06010)	3	3	100%	X (0)
Chestnut-collared Longspur (ABPBXA6040)	6	0	0%	X (0)
Lewis's Woodpecker (ABNYF04010)	3	2	67%	
Mccown's Longspur (ABPBXA6010)	6	0	0%	X (0)
Northern Goshawk (ABNKC12060)	3	19	633%	
Regal Fritillary (IILEPJ6040)	1	1	100%	
Smooth Green Snake (ARADB47010)	3	18	600%	
Three-toed Woodpecker (ABNYF07080)	4	7	175%	
White-winged Junco (ABPBXA5022)	4	7	175%	

DETAIL INFORMATION

American Peregrine Falcon (Falco peregrinus anatum)		Rank	Count
	No sites include this target	N/A	0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Bald Eagle (Haliaeetus leucocephalus)		Rank	Count
Eastern Foothills	Northern Hills Spring Creek (4)	N/A	1
	Wind Cave/Custer (40)	N/A	1
Northern Central Core	Black Fox (22)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		3
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Bear Lodge Meadow Jumping Mouse (Zapus hudsonius campestris)		Rank	Count
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	N/A	3
	Reuter Canyon (3)	N/A	1
Northern Limestone Plateau	Sand Creek Botanical Area (7)	N/A	1
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		6
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Black Hills Red Squirrel (Tamiasciurus hudsonicus dakotensis)		**Rank**	**Count**
	No sites include this target	N/A	0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**7**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Black Hills Red-backed Vole (Clethrionomys gapperi brevicaudus)		**Rank**	**Count**
	No sites include this target	N/A	0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**7**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Black-backed Woodpecker (Picoides arcticus)		**Rank**	**Count**
Southern Central Core	French Creek (31)	N/A	1
Southwestern Foothills	Hell Canyon/Jewel Cave (32)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**4**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**50%**

Black-tailed Prairie Dog (Cynomys ludovicianus)		**Rank**	**Count**
Eastern Foothills	Wind Cave/Custer (40)	N/A	1
Northwestern Foothills	Devils Tower/Missouri Buttes (1)	N/A	1
Southwestern Foothills	Cheyenne River Canyons (37)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		3
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Chestnut-collared Longspur (Calcarius ornatus)		**Rank**	**Count**
	No sites include this target	N/A	0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Lewis's Woodpecker (Melanerpes lewis)		**Rank**	**Count**
Southwestern Foothills	Cheyenne River Canyons (37)	N/A	1
	Stockade Beaver Creek (20)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		2
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**67%**

Mccown's Longspur (Calcarius mccownii)		**Rank**	**Count**
	No sites include this target	N/A	0
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		0
	CONSERVATION GOAL		**6**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**0%**

Northern Goshawk (Accipiter gentilis)		**Rank**	**Count**
Eastern Foothills	Bear Beaver Gulch (9)	N/A	1
	Davenport Cave/Beaver Park (11)	N/A	1
Northern Central Core	Bear Butte Creek (12)	N/A	1
Northern Limestone Plateau	Bear Beaver Gulch (9)	N/A	1
	Little Spearfish Creek (14)	N/A	2
Southern Central Core	Canyon City (25)	N/A	1
	French Creek (31)	N/A	6
	High Granite Region (29)	N/A	3
Southern Limestone Plateau	Stockade Beaver Creek (20)	N/A	1
Southwestern Foothills	Stockade Beaver Creek (20)	N/A	2
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		19
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**633%**

Regal Fritillary (Speyeria idalia)		**Rank**	**Count**
Southern Central Core	Wind Cave/Custer (40)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		1
	CONSERVATION GOAL		**1**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**100%**

Smooth Green Snake (Liochlorophis vernalis)		**Rank**	**Count**
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	N/A	1
Northern Central Core	Black Fox (22)	N/A	1
Northern Limestone Plateau	Davenport Cave/Beaver Park (11)	B	1
	Little Spearfish Creek (14)	N/A	1
Northwestern Foothills	Stockade Beaver Creek (20)	N/A	1
	Upper Sand Creek (16)	N/A	1
Southern Central Core	Canyon City (25)	N/A	1
	Castle Creek (21)	N/A	2
	French Creek (31)	N/A	2
	High Granite Region (29)	N/A	1
	Rapid Creek (26)	N/A	1
	Reynolds Prairie (23)	N/A	1
Southern Limestone Plateau	Castle Creek (21)	N/A	1
	Stockade Beaver Creek (20)	N/A	1
Southwestern Foothills	Stockade Beaver Creek (20)	N/A	2
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		18
	CONSERVATION GOAL		**3**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**600%**

Three-toed Woodpecker (Picoides tridactylus)		**Rank**	**Count**
Northern Central Core	Black Fox (22)	N/A	1
Northern Limestone Plateau	Spearfish Canyon (13)	N/A	4
Northwestern Foothills	Bear Lodge/Beaver Creek (2)	N/A	1
Southern Central Core	High Granite Region (29)	N/A	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		7
	CONSERVATION GOAL		**4**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**175%**

White-winged Junco (Junco hyemalis aikeni)		Rank	Count
Bear Lodge Mountains	Bear Lodge/Beaver Creek (2)	E	4
Northwestern Foothills	Northern Hills Spring Creek (4)	E	1
	Upper Sand Creek (16)	E	1
Southwestern Foothills	Elk/Pilger Mountains (36)	E	1
	TOTAL TARGET OCCURRENCES CAPTURED BY PORTFOLIO		7
	CONSERVATION GOAL		**4**
	PERCENT GOAL CAPTURED BY PORTFOLIO		**175%**